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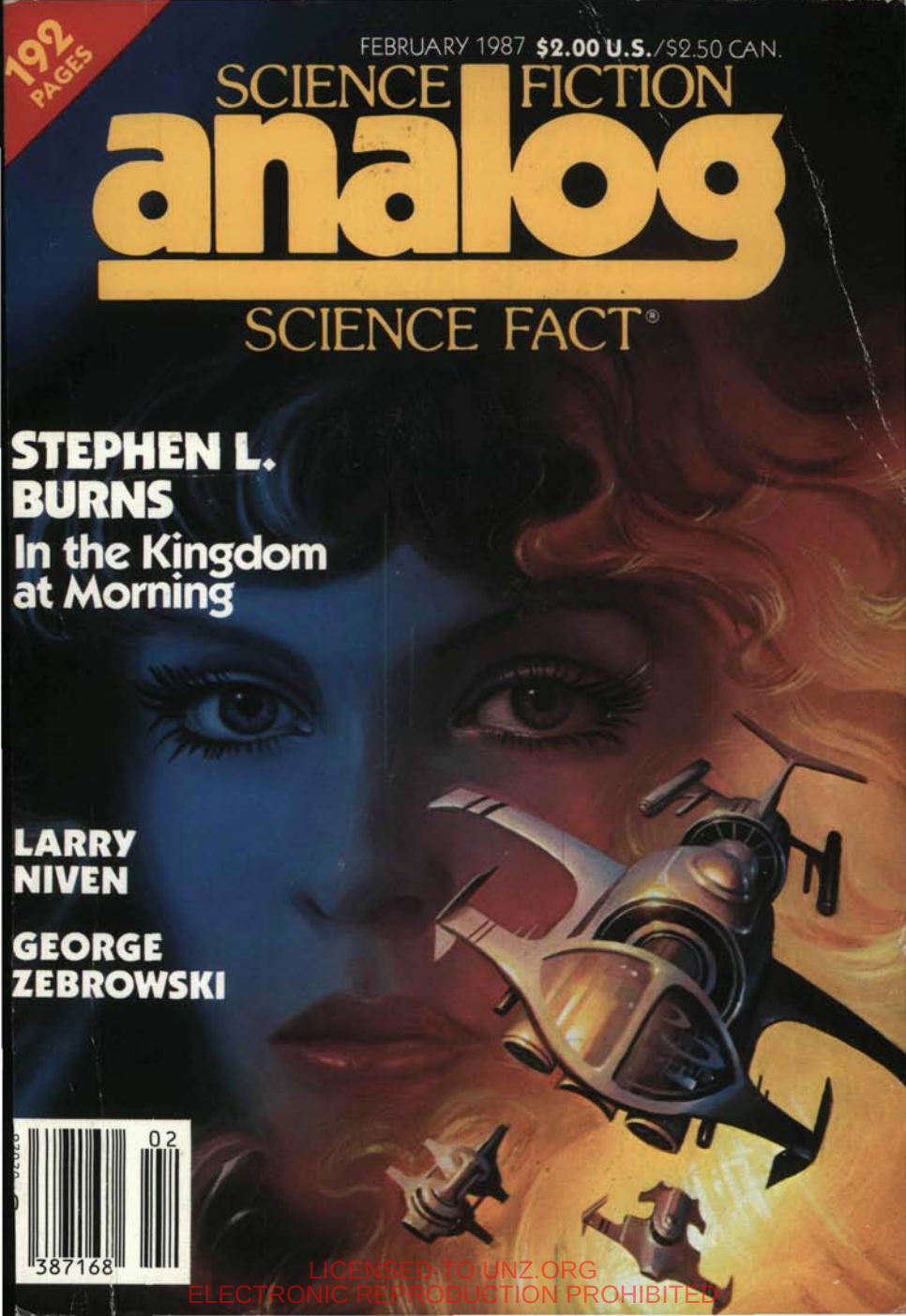

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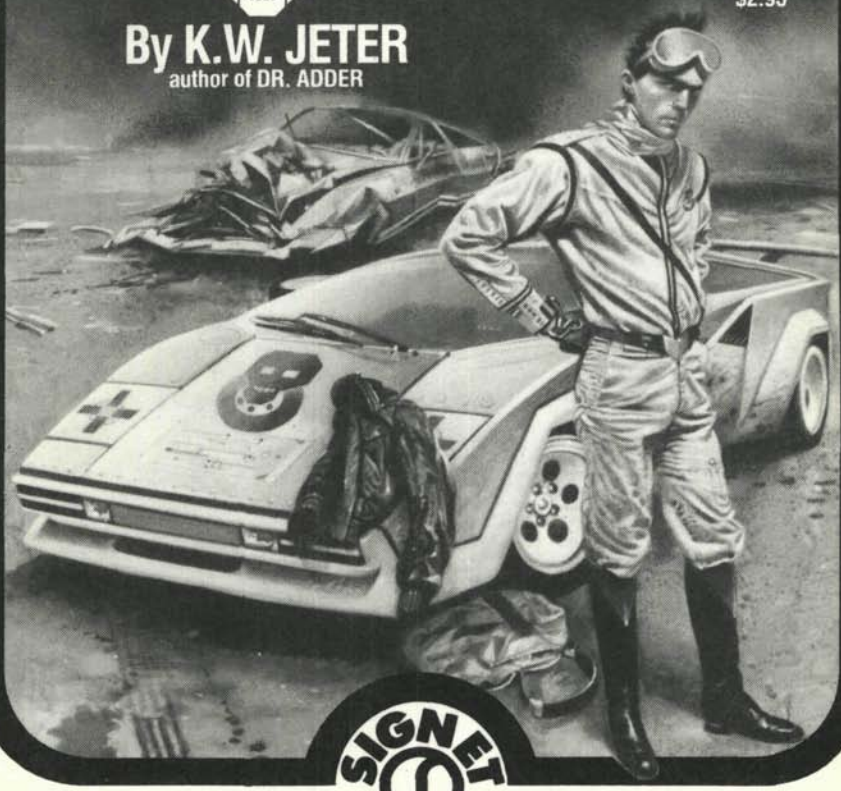

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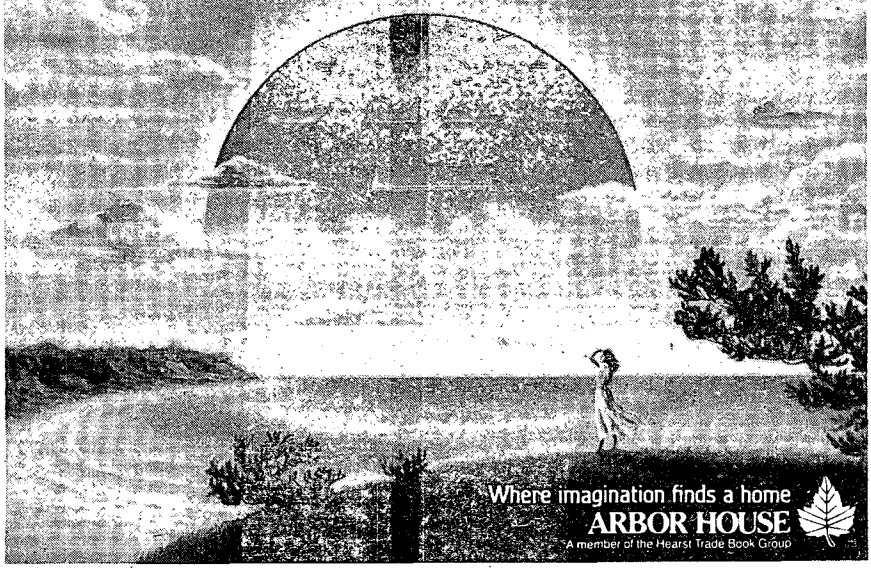

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Editorial

THE GYPSY AND THE PROCRASTINATOR

Stanley Schmidt

Within the next year or two, landowners and forest managers in the general vicinity of New York City will face a clear ecological problem of considerable magnitude. This won't come as any surprise to them; it's happened before and anyone who was around last time and has a memory good for more than a few years knows it will happen again. Many Northeasterners even know approximately *when* it will happen again—which might lead one to expect that they'd be doing more to head it off *before* it happens. If you don't live in the Northeast and so think this doesn't concern you, you might want to read a bit further anyway. It's headed your way, at some ten miles per year—and if nothing else, you might find it an interesting case study in human foibles.

What I'm talking about is the gypsy moth, *Lymantria dispar*, a destructive pest of forest and shade trees that finds oak leaves particularly tasty. In summers when they're numerous, gypsy moth caterpillars defoliate so many trees so thoroughly that whole mountainsides revert to the barrenness of winter. If you're in a forest they're working on, you can literally hear their chewing and the pitter-patter of their droppings.

It's true that most trees survive and grow new leaves within a few weeks after the caterpillars finish eating and settle down to pupate. But each year a

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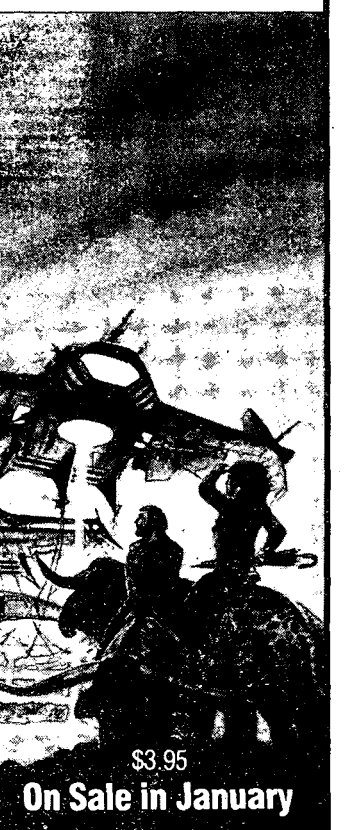
IS THIS THE END OF ALACRITY FITZHUGH???

BRIAN DALEY
FALL OF THE WHITE SHIP AVATAR



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small but nontrivial percentage of the denuded trees die. It might be argued that those which the caterpillars kill were already sick or weak, and that in the long run their culling may lead to a stronger, healthier forest. It's not at all clear, though, that that improvement will happen fast enough to offset the loss of trees while it's happening (evolutionary improvement is pointless if the species being improved becomes extinct in the process!), or that the moths themselves won't improve at least as fast as the trees (likely, in view of their much shorter life cycle). Even if you assume a "best case" prognosis in which the current battle between trees and moths leads to healthier forests and starving moths, the short-term prospects for small landowners are not encouraging. If the pride of your home is an eighty-foot oak that doesn't recover, the fact that it's "just one casualty" is little consolation for either the loss of the tree

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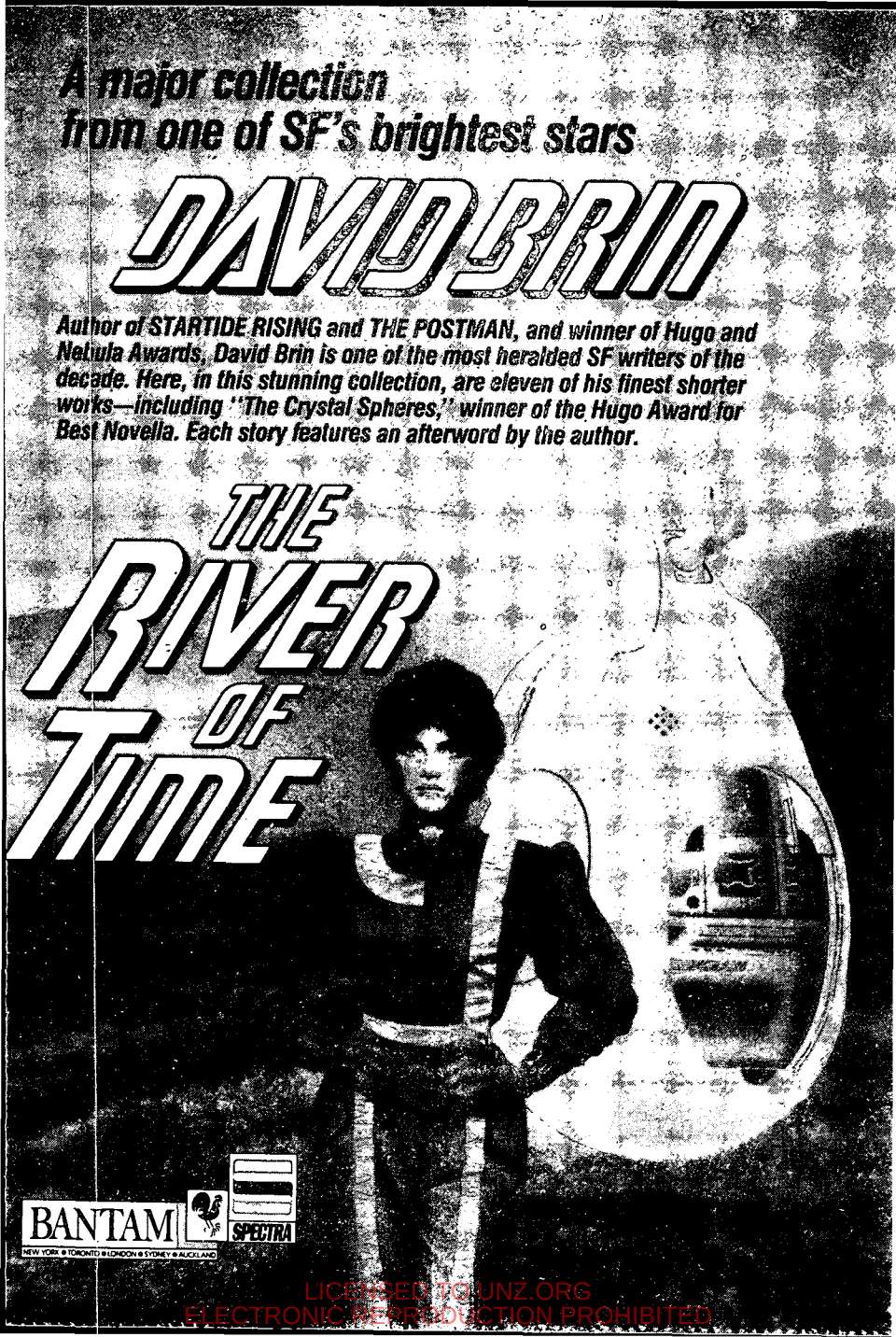

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or the expense of having it removed.

Therefore gypsy moths have few human friends. Lots of money and man-hours have gone into efforts to control their population, and most people would like best to eliminate that population altogether. This might horrify some who don't like the idea of tampering with ecological balances, but the gypsy moth is native to Europe, not America; it seems to have been brought to Massachusetts accidentally in the late 1860s. Lacking natural predators on this side of the Atlantic, it has been expanding its range and growing in numbers ever since—but not steadily.

The gypsy moth population varies cyclically, though not in the same way as that best-known example of insect periodicity, the 17-year cicada. That cicada is totally absent for 16 years out of 17; in the seventeenth year, vast numbers emerge from burrows where they've been slowly growing, mate, and lay eggs that hatch into nymphs, which then disappear into burrows and wait 17 years to repeat the process. The gypsy moth cycle, in contrast, is annual—at the individual level. There are always *some* around, laying eggs each summer which hatch into hungry caterpillars the following summer. But the *population* varies cyclically over a wide range. Last I heard, the reasons for the cycle weren't completely understood, but seemed to involve the exponential growth to be expected in the absence of effective predators, followed by a sudden collapse mediated at least partly by a virus disease that *usually* doesn't have much effect but becomes a powerful epidemic when the caterpillar population gets large enough. Most of the caterpillars die off, taking most of the viruses with them, and the few survivors start building a new population explosion.

In our area, at least, the period between population peaks seems to be pretty well established at something like seven years. The last big year where I live was 1981, and I remember *lots* of local advertising for anti-caterpillar weaponry. Available options included chemical pesticides (despite the drawbacks that were already casting them into disfavor); sticky goop to paint in a band around trunks of food trees so caterpillars got trapped in their daily commuting from ground to treetop; *Bacillus thuringii*, a bacterium that attacks caterpillars but not people; and pheromone traps, using the scent of a female moth to lure males into a box from which they were too stupid to escape.

What I find intriguing is that hardware and garden stores were doing a brisk business in these things in the year when the problem was already as bad as it was going to get anyway—but not before. That cycle, too, is now repeating. Seven years, if I remember rightly, is how long the rise and fall of a caterpillar population takes around here; and the last one was five years ago as I write this. That gives us two years until the next peak—and there is abundant and plainly visible evidence that that peak is already approaching. The caterpillars are not yet committing massive mayhem on pet trees in populous neighborhoods, but I saw more caterpillars earlier this summer than last, and

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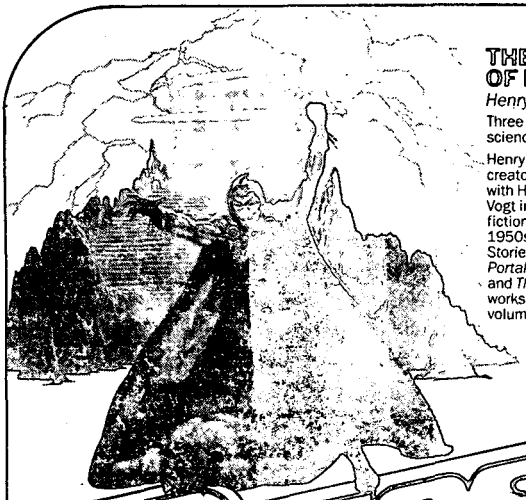

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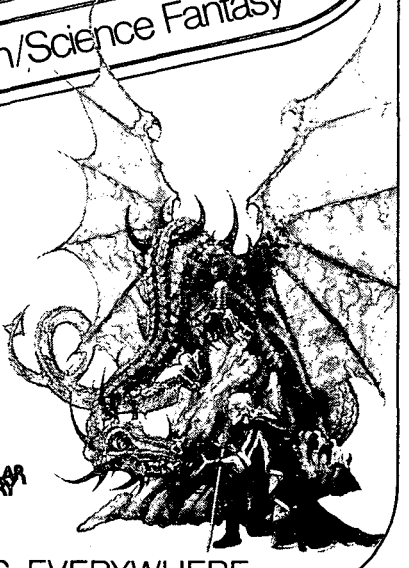

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I'm seeing more adult moths now. I started noticing large defoliated patches on nearby hillsides last summer, and there were conspicuously more this year. It occurred to me as soon as it became clear that we were getting close to another peak year that *now* would be a good time to set up a pheromone trap—but I was unable to find one in a store, much less see them advertised. (I did find one store with a small quantity of baits to refill old traps, but our old trap was not built for reuse and we don't have it any more.)

Think about it. It's common knowledge that the gypsy moth problem builds to a peak over seven years or so, and then it solves itself for a while—but before it does so, the caterpillars do plenty of damage. Attempts to kill caterpillars at that point are a drop in the bucket—they may reduce the damage and hasten the collapse somewhat, but by then it's too late to attack the problem in a really effective way. Furthermore, killing caterpillars requires using chemicals or bacteria. Overusing either may simply lead the moths to develop resistant strains, and the chemicals have the added disadvantage of toxicity to humans, other animals, and crops. Wouldn't it be preferable, if possible, to use a *nontoxic* method of *preventing* the population build-up, instead of trying to squash it after it's out of control?

The pheromone trap seems to offer a way to do that—but only if it's used *before the peak is reached*. The traps are impressively effective; when I started assembling one there were no moths in sight, but before I finished (and it only takes a couple of minutes) several had appeared and were struggling fiercely to be first inside. Once inside, they would be fertilizing no more eggs, so such traps would have to reduce the size of the next generation. The trouble with using the traps in the peak year is twofold: (a) the worst damage is already done, and (b) the next generation is going to be a lot smaller anyway. It's a little like applying the brakes after you hit the wall instead of when you see it approaching.

Why not use the traps *before* the peak, when the population is obviously building but hasn't yet gotten out of hand? Each generation which is reduced must consequently reduce the following ones. Widespread use of the traps *early* in the cycle might well lessen the impact of peak years, or lengthen the time between them, or both.

But to be effective, there would have to be *widespread* use. A few isolated traps here and there can't accomplish more than perhaps a slight local improvement. *Lots* of traps, all over, might actually do something for the large-scale problem.

The trouble is that people don't think that way. Very few people give much thought to a problem until it has become immediate and severe—even if it's a problem that they know intellectually recurs regularly and could be prevented by advance action. So gypsy moth traps and control substances are big items of commerce in peak years, and hardly anybody mentions them between peak years.

Is any of this intentional? The com-

continued on page 191

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Arlan Andrews

"It was the term, *faster than C*, that finally revealed to me, in a flash," the physiologist said, "that there were phenomena quicker than light."

"*Quicker* than light?" the question sputtered incoherently out of the physicist's mouth. "What do you mean, *quicker?*"

Dr. Mikelovitch, the physiologist, smiled, eyes twinkling. Observing that the optical scientist was puzzled, he nodded toward the instant camera in his hands. "How many times have you taken flash pictures, Dr. Lee?"

"Why, thousands, just like you and everyone else. What's that have to do with this problem?"

"Simple—we've all photographed our family and friends, and invariably the subject will have his or her eyes shut. How can this be?" He sketched out a diagram on an illuminated sketch board on an adjacent optical bench.

"Visualize this scene: The subject is standing there, waiting for the big moment, eyes all agog. Suddenly, a flash of light blinds him; he reacts autonomously and closes the eyes against the bright light. The picture turns out so—"

Dr. Mikelovitch spun around and flashed his camera. Dr. Lee blinked; in thirty seconds a brilliant image emerged on the film, showing the physicist's eyes closed tightly in reaction to the flash.

"You see," said Mikelovitch coruscatingly, "here it is! My proof: you saw the light coming and reacted quickly enough to close your eyes as the flash illuminated you, and before the light could bounce off you and get back to the camera!"

"Let's see: two meters between us, divided by the speed of light, is, umm, some seven billionths of a second! While light crawled along at three hundred million meters per second, your eyelids had time to witness the flash and shut before the light arrived!"

He paced around the room in the late evening golden sunlight that arched through backlit clouds, into the lab windows. He turned to view the physicist.

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"I have done extensive research on this blinking, and my suspicions are borne out in testing by Dr. Mohr, our high-speed photography researcher. We believe eyelashes act as antennae that discriminate among the ethereal vibrations, reacting to previously unsuspected precursors of light waves that travel ahead of the light wavefront, to smooth the path, so to speak." His eyes lit up with maniacal fervor, eyebrows a dark V.

"I ask your help, Dr. Lee, to lighten the load as Dr. Les Mohr and I embark on the path toward illuminating this phenomenon." His eyes gleamed. "Don't you see? *Our own eyelashes are quicker than light!*"

"And so, children," the Historian said, "we have the story of the development of the QTL drive that powers our so-called 'shadow ships' as they wink across the Galaxies, those great orbs that made possible our galactic civilization, and the equally important isolation of our only possible rivals, the I'sori, who luckily for us did not possess eyelids and so never uncovered the theory of superluminal eyelash displacement." The light tone vanished; the students prepared for their instructor's usual flash of brilliance, but the expected scintillating insight, the typical masterful exposure, never came.

"There remains a mystery for us historians, and it darkens my soul to think once more upon it, a fact that has been brushed aside in the folds of history." He sighed. "We know that Drs. Mikelovitch, Mohr, and Lee developed the QTL. It should have been named after them." The teacher viewed the pupils in the video classroom with downcast eyes.

"No one knows, and I suppose never will, why it is called the *Revlon Drive*." ■

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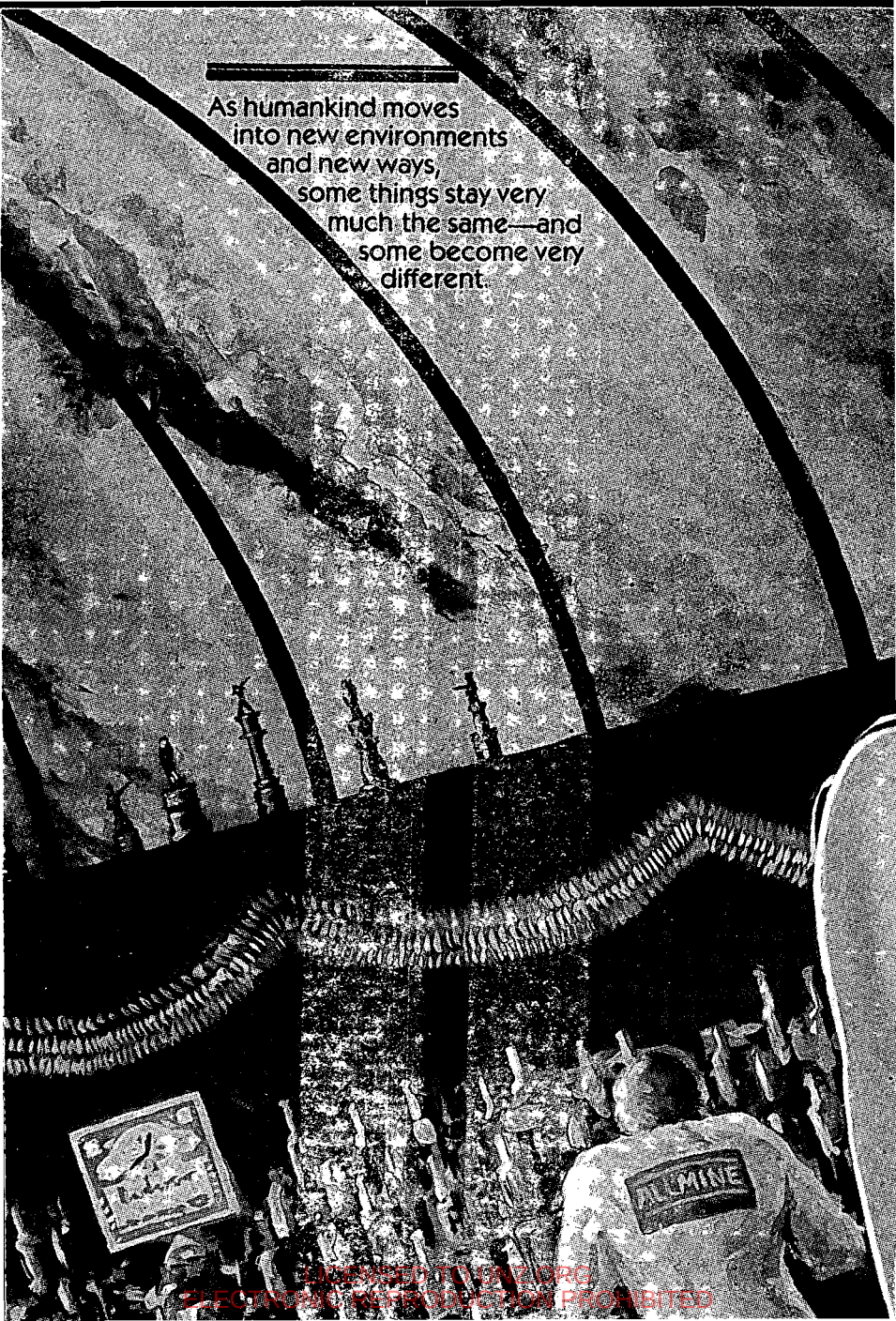
As humankind moves into new environments and new ways, some things stay very much the same—and some become very different.

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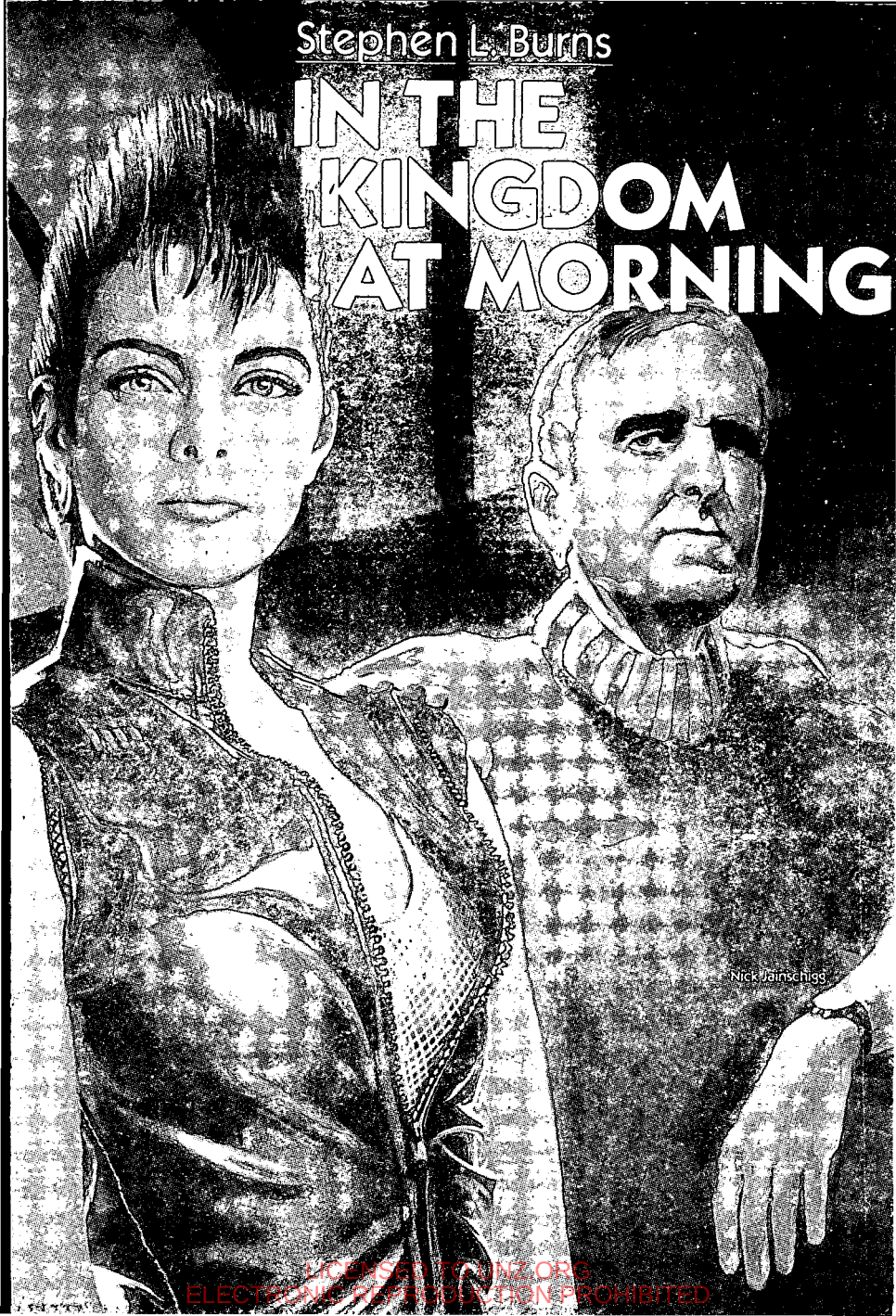
Stephen L. Burns

IN THE KINGDOM AT MORNING



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It is a long story, and one well worth the telling. I want to tell it to you, but where to begin?

Few things can be understood unless you have some grasp of the past that led to them. That is especially true of people and their actions.

But the past never stops; it unrolls endlessly, seamlessly, and inextricably from every moment great and small. No moment can really be broken free from its bed of eternity. But if you want to tell a story of people and events —especially a true story—then you must found it on a lie. Pick a place, point to it, and say: *There. That is where it all began.*

So where did this story begin?

For me, I guess, it all started when I first met the woman this is mostly about. Looking back, she fills my eyes and thoughts.

This is how I remember her, and the times we lived and made.

The Other Lode was the big, beerhall-style bar in the outermost, seven-tenths-g level of the Kingdom. It was huge and high-ceilinged, covering a large enough area for the floorcurve to show. Its center was dominated by a circular bar, the surrounding area scattered with tables and multi-seat GameMasters. Two walls were given over to semi-private alcoves. It was mostly a miners' bar, with no loud music or vectshows to interfere with the serious business of drinking. The other bars supplied such fancies, but not the Other Lode.

I was polishing glasses behind the bar when she came in, the others on duty drawing and serving. I knew right off that she wasn't a contractee, and I hoped she wasn't trouble. It was no Happy Hour she was walking in on; the atmosphere in the Other Lode was sharp and heavy as an axe. An axe poised to fall.

That was no surprise. The times were uncertain—or seemingly all too certain. Anger, outrage, and frustration were the prevailing moods, and for good reason. A lot of what I was serving was on the house that evening. The poor bastards deserved some sort of break.

Voices died and heads turned as she paused in the doorway. The hard-eyed sharpness remained and redoubled, with a stiff shot of wariness added to the mix. I swear I could almost *hear* the hackles rise on every man and woman upon seeing an intruder on their turf. Normally they're not so unfriendly.

The woman was obviously a spacer; you didn't need to see her Pilot's earring to see that. She scanned the bar, apparently on the verge of turning around and leaving, until she spotted me. She sighed, squared her shoulders, then headed in toward the bar.

I enjoyed watching her approach. She moved with the liquid grace of a stalking cheetah, an image reinforced by her lithe, muscular build and skintight black zipsuit. There was a kind of dangerous beauty about her, some scent of the jungle.

Yet I had the feeling that something was wrong with the picture I was seeing, and it didn't click until she was almost to the bar. Most Pilots radiate an easy arrogance which is as insufferable as it is unmistakable. Instead this woman seemed tense and wary, and I don't quite know how to explain this, but to me there seemed something sort of *lost*

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about her. Something subtle, indefinable.

Room cleared at the bar when they saw she was heading my way. Looking neither left nor right at the faces staring at her, she slipped onto the stool directly before me.

"Welcome to Crazy Eddie's Kingdom," I told her. "And welcome to the Other Lode, to be precise." I knew she was new to the Kingdom. It wasn't likely I'd forget a face or form like hers.

She stared at me expressionlessly. "Am I really?" Her eyes were a remarkable pale gray, close to the color of the dirty ice the miners pried from Europa's frigid breast.

"You are," I assured her. "What's you pleasure?"

Her mouth quirked. "I have several. Gin and a bit of banter will do for the moment."

I grinned at her. "This morning's batch of poison or the Good Stuff? The gin, I mean. Banter's always fresh."

"Surprise me—unless making a choice Borgia." She was almost but not quite smiling. Under her stiff black hawk's-crest of hair her face was lean and hard, but it wasn't the hardness of meaness or cruelty. They say your times make your face. I could tell just by looking that hers had been chiseled out by some real rough times. It showed in every angle and plane; they were like walls holding an awful lot of something in and trying to keep the rest out.

I set up two glasses then filled them with the Good Stuff, shipped across over 180 light-seconds from old Earth herself. I took a sip and smacked my lips. "Bitter and delicious."

Again that almost-smile. "Just like life." She drained her glass in a single swallow, then eyed me curiously. "Crazy Eddie King is a legend in his own time," she said. "Funny, but you don't look too-good-to-be-true-ish."

I put on a stone face, more delighted with her all the time.

"Are you saying I've slipped an incognito?"

Then the unexpected began. Instead of laughing, she stiffened, her face draining of all expression. Her hand gripped her empty glass hard enough to shatter it.

The muttering in the rest of the bar had been rising, but I guess I had been tuning it out and giving all my attention to this intriguing newcomer. Glancing past her, I saw Core and Rabo Tayavitch, two of the senior miners, lumbering up behind her, their faces as set and grim as hers had become.

Spacers move like the big cats. Miners move like tractors; all the extremely low-g suit-time they rack up gives their movements a ponderous deliberation they keep even outside those suits.

Core was short and heavy, almost as broad and brawnily built as her husband Rabo. She dropped a meaty hand on the Pilot's shoulder. "Now who you be, woman?" she growled, her pug nose wrinkling in distaste, "AllMine spy makin sure we hurtin enough? Or maybe you compny muscle come a-hasslin' our Eddie, you?"

"Ease off, Core," I told her, "I don't think—"

I never finished what I'd started to say. The spacer put down her glass and turned slowly on her stool until she was facing Core. Their eyes met, locked. Neither woman said a word. Heads

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turned and more frowns appeared. Rabo shifted from foot to foot uneasily.

I was already backing down the bar to get room to jump over and break up the fight I was sure was coming. I never took my eyes off them, but seeing what was afoot and understanding it were two completely different things.

They stared at each other, rigid as statues. The anger on Core's face melted into confusion. The silence wound tighter and tighter until it nearly hummed. Finally it snapped when the Pilot licked her lips and spoke.

"What has been done to you?" she whispered. Her voice was low and husky. I could see tears welling up in her eyes.

Core stared back at her, blinking furiously. Then the tough old miner's blunt, careworn face crumpled. She threw herself up agaist the spacer, wrapped her thick arms around her, hid her face against the younger woman's neck and began crying like a child.

I had no idea what was going on. I caught Rabo's eye. His ruddy, rock-rough, black-bearded face wore a look of total confusion.

"Do you and Core know her?" I asked. Rabo shook his shaggy head. *No.* Core wept on in the spacer's arms, letting out great braying sobs.

After a minute the Pilot looked up at me over Core's close-cropped gray curls. Her eyes were damp and red, her thin face bleak and somehow resigned.

"Is there someplace private the four of us can go?" she asked.

I nodded dumbly. There was, and that's where I took them.

Of course the Pilot's name was Gemyn, a name now known almost as well as mine. But not then, and *damn!* I'm getting ahead of myself.

It's strange. I've managed a couple-three odd impossible things in my life, but trying to tell this right may be beyond me. If I get it all tangled up, please be patient and remember that I was all tangled up *in* it. Moreover, trying to tell even a small part of the whole story is like trying to pour a whole gallon of wine into a shot-glass; even if I pull it off, it's bound to get a little sloppy.

Look, the odds are against me. Whole chips have been devoted to my checkered career, and at least two of them about my part in the Great Escapade. But there is no more of the real me in them than there is truth in the proposition that you can breathe vacuum if you really work at it. But that's not the point.

The point is this: Nobody's life can be trimmed to fit in the limited space of a story or a chip without leaving almost everything out, and that is true of Gemyn's life more than most. There is too much to tell about what she used to be, about what she had been through, about what had been done to her, about what that had turned her into, and about the things it had led her to do. All I can try to tell here is how incredibly strong she was, and how terribly helpless. I'll be doing well if I can tell just that.

Did you find all that confusing? You should have wandered blind through it, living it. If I understand it now, it's because that's how life is; it only becomes a semi-coherent picture in retrospect. And even then. . . .

As long as we're on the subject of semi-coherent pictures, let's get into a

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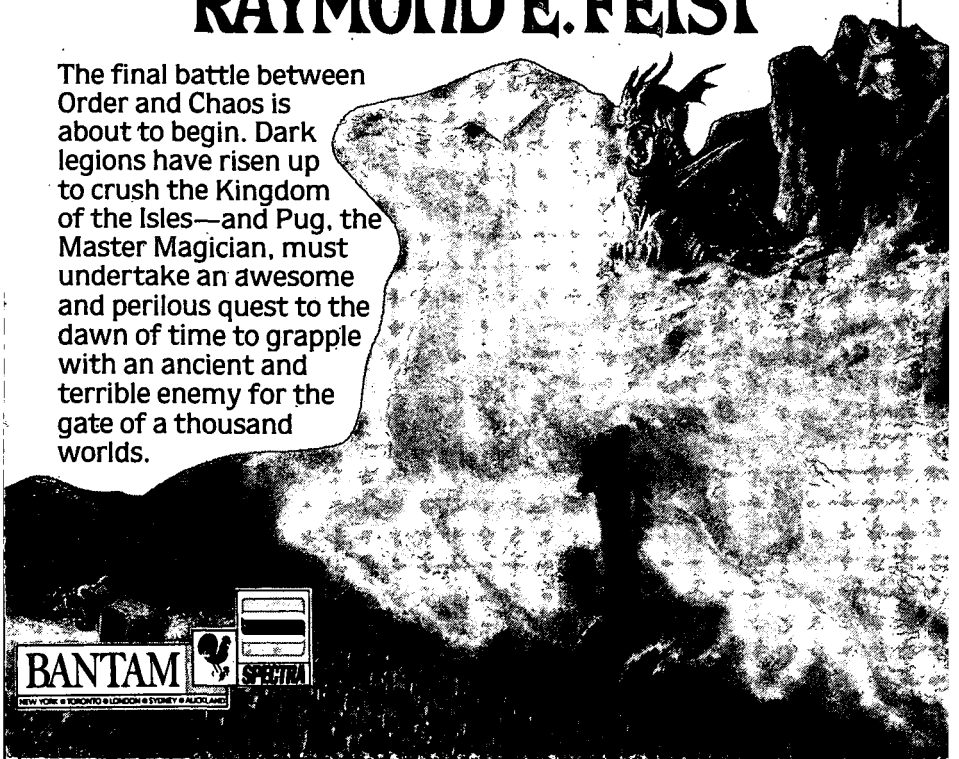

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little history. Since these days anything which happened over a year ago is considered Ancient History, and all this took place long enough ago to have gotten fuzzed out in the skullmurk where everyone dumps his yesterdays, here is a little capsule history. I promise to be (mercifully) brief.

Once upon a time (in a solar system all around you), there was a paunchy, middlish-aged tycoon named Crazy Eddie King. This Crazy Eddie person was a legend, for all sorts of reasons, not the least of which was his total unpredictability. You just never knew what he was going to do next. The truth is *he* rarely knew either.

You see, he rather suspected that he was like the fabled centipede, in that if he ever stopped and really *thought* about how he coordinated all those legs of his he might end up flat on his back with all his little legs waving in the air —probably in hopes of hailing a cab or an ambulance.

Well, one of the unpredictable things he did was build the Kingdom, and match to it a detachable farming /manufactory complex called CoatTail Station; said Station coming complete with its own detachable, automining autofac. The Kingdom was *big*, a thousand-plus hab, self-contained miniature mutant cylty—cylinder city. The whole mess mated together, and he had it and himself taken away from the populous areas of the Belt and all the way out to the frontier areas among the moons of Jupiter. He had his pilot snug it into a neat little orbit in between the orbits of the Jovian moons of Leda and Callisto, some 9,000,000-odd kilometers out from the Big J.

Now at the time the Kingdom (*and* CoatTail) galumphed into its groove there were only a few motley skin-of-their-teeth settlements and starving wildcat mining outfits out there. The area around Jupiter was vast, and humanity was spread thinner than a single butter pat on a mile-long loaf of bread.

CoatTail was already up and running. He sent it out near Leda, which the little automining afac began nibbling at for the raw materials CoatTail turned into food, water, air, fuel, and a little bit of everything else.

In less than a week he was trading with the settlements, giving them the best of the deals to build up good will. He and his staff made certain that the Kingdom was ready, then he settled back to wait for the Kingdom's real purpose to arrive.

Some three weeks later, three gargantuan self-propelled autofacs pulled into orbit around Jupiter, carrying over 1500 miners and workers. The autofacs (afacs for short) were owned by AllMine, the largest, most powerful, and most ruthless of the space-based MuNat consortiums.

Crazy Eddie was waiting for them with open arms, a smile on his foolish face, and larceny—among other things —in his heart.

There we were, just the four of us in the office I kept in a room off the back of the Other Lode. There was me, the legendary Crazy Eddie King, owner of Crazy Eddie's Kingdom, CoatTail Station, and a whole bunch of Ceres and Belt-based businesses I'd left behind to be run by one bright nephew and my deadly dull accountants.

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Then there were Rabo and Core, husband and wife mining team and unofficial leaders of the miners and workers. Two good, strong, decent people; third generation contractees who had dared to dream a little and had seen that dream twisted into a nightmare by AllMine. Their fifteen-year-old son Glen was in company custody and their hopes and plans had been reduced to ruins. AllMine had rolled over them like a bulldozer over a pair of kittens.

Lastly there was Gemyn, the enigmatic stranger. Wild card in the game about to commence, a game with lives for the stakes.

The sad tale of the recent unhappy events had been mostly told. Gemyn listened attentively but said little, remaining aloof but not uninvolved. At last she slumped back in her chair, rubbing her eyes and looking exhausted.

"Let me see if I have it straight," she said. "Several of you formed a clandestine co-op and leased a ship." She glanced my way. "At a ridiculously low price." I grinned and shrugged.

She turned back toward Rabo and Core. "You knew that the Saturnian moons are going to become the next frontier in the years to come. So you were going to pay out some of your own contracts, complete your complement with your uncontracted teenaged children, take the ship in Enceladus, and try to set up a stake as independents."

"They had to try to bust loose somehow," I put in. "You know the old joke. Allied Mining changed its name to AllMine because that was what they figured everything was anyway. They've made themselves a bad reputation in their sunward operations, and out here there's no one to stop them from becoming a law unto themselves. Everyone out here, all the free habs and shoestring settlements are all but helpless against them. But the contractees are the worst off.

"Bad as contracteering is sunward —and it's bad—out here AllMine's turned it into slavery, pure and simple. A contract is like your skin—there's no getting out of it alive. They haven't missed a trick in stacking the deck against the contractees and everybody else. Shortmassing ores and ices, penalties for missing impossible quotas, dropping the price per mined tonne, jacking up equipment assessments or dropping hours or some other damn thing if they see anyone getting ahead. The rip would be worse if I weren't here. Then everyone would have to pay their price for hab-space or suck vacuum."

"We scrimped and saved for years," Core said, her voice low and shaking with anger. "Almost fifty families to get survey an' get that ship. AllMine find out what we plannin' and grab it, 'restin our Glen an ever one else on board. Then th' compny trots out guns an' drugs they say compny muscle find on ship, the lyin' bastards."

Gemyn sighed. "And you say that now they've decided to launch one of their afacs toward Enceladus to claim it for themselves. Within the week."

Rabo muttered something short and pungent in Russian before going on in his broken English. "They find assay maps we hire done by singler paid with own money. Rich moon, ideal mining, they see. Plum for taking. *We* take this plum, they say—who gonna stop us?

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They going!" He slammed his big rough fist on the table, making our glasses jump. "They going. We not, we got *nothing*. No ship, ever cent we saved gone, our sons and daughters in comp'ny's bucket. Our *Glen* in comp'ny bucket!" His heavy black brow furrowed and he scowled at his fist, caught somewhere between smashing it through the table in his frustration or using it to hide his face so he could let go of his grief. Core's and his lives had been spent trying to reach one small goal: keeping their son from being locked into dead-end contract like their own. But now the Company had the boy. They would never let him go uncontracted.

Core reached over, covered his fist with her hand. Rabo's shoulders hitched once, and he hid his face with his other hand.

Gemyn sat there watching them. Her face had that strained, stretched expressionlessness of someone trying to hold something big and terrible inside. It was a look you see in hospital waiting rooms, at funerals. Behind a glass at a bar.

She tore her gaze away from them and stood up, her movements slow and jerky. She looked my way, the hard angles of her face softening ever so slightly. "Is there a room for me somewhere?"

I forced myself to simply nod. "R14, this level, just down the corridor on your right. It will be unloacked." *Can I come see you?* I wanted to ask, but it was the wrong time. I kept my mouth shut.

Her eyes held mine a second. "Yes." Then she faced Rabo and Core. "Will you be in the bar tomorrow? I must talk to you again."

Rabo looked up, wiping his face. "Can be if—"

Core cut him off. "We be there." She leaned forward, gripped Gemyn's hand. "Thank you, friend."

Gemyn's reply was toneless. "I haven't done anything but listen."

Core's blunt face broke into the first smile I'd seen her wear since her son Glen had been arrested. "But you will," she said.

It was late, but I hadn't been able to talk myself out of it. I kept seeing her, kept hearing that strange, out of nowhere *yes*. I talked myself into it and out of it a dozen times, but in the end I couldn't stay away.

So I took a deep breath and pushed the button. The door slid open. The room was dark, and I wondered if I'd woken her up.

I could just make her out in the light let in by the open door. She sat in shadow, slumped in a chair facing the bed. The room was tomb-silent, and I had a feeling she had been waiting for me.

"I don't charge extra for the lights, you know." I told her as I walked in. I went to the bed and sat down in front of her.

"I need a little dark and quiet," she said, then told the door to shut. The room was plunged into darkness, but for the faint glowstrips around the door and emergency p-suit locker.

"I was hoping I could—uh—see you," I began, trying to keep myself from making snuffling noises as I drew in the heady sweet scent of freshly bathed woman.

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"Will you settle for just hearing me?"

"That depends. Will *you* settle for homebrewed brandy?"

She may have laughed, but the sound she made was so soft that I wasn't sure. "I think we're going to be friends, Eddie."

"Lovers?" I didn't mean to say that out loud, and the moment it left my stupid mouth I wished I could take it back.

She was silent long enough for me to begin thinking about biting my tongue off to teach it a lesson. "Maybe," she said at last. "I have a feeling that stranger things have happened to both of us."

"Here." I handed her the bottle of brandy, my relief picking up compound interest when she let her hand linger on mine to signal no harm done. "You can beat me with it if you want to."

"Maybe when I know you better." I heard her break the seal, heard her swallow, then sigh unhappily. "Rabo and Core are angry. That's bad, but I could live with it."

She drank again. "But they've been hurt so badly . . . they and all the others. The *despair* they feel, it's unbearable. The mood of this place, the hurt and frustration. Can you feel it Eddie?"

"Some, I guess. They're my friends, they're my kind. Like I said before, they're little better than slaves out here. Rabo, Core, and the others were driving themselves to the breaking point to make that Enceladus claim, more to free their children than themselves. To get their kids away before they could be chained to contracts.

"They're not stupid people. They

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know that the moons of Saturn are going to be the next frontier, that only out there will their children have a chance to lead free lives. They know their kids don't have the education or sophistication to last long sunward, even if their parents could afford to send them back in.

"I know these people. If they could have pulled it off and gotten there, they would have made a go of it, would have survived. When others followed a few years down the line they would have been waiting there with all the raw stuff of survival on hand and ready to sell. They would have founded something worth working for, given their children something better than the hard, dead-end road AllMine was waiting to put them on. Even the non-members were counting on this. It would be proof that there was a way out after all." I stopped talking, realizing I had been preaching.

I heard a rustle as Gemyn shifted in her seat before speaking.

"So you outfitted them for the attempt for next to nothing. Was it because you grew up with your parents under AllMine's thumb back in the Belt and *you* managed to get free?"

I had to laugh, partly to break up the tension. "Read one of my unauthorized biographies, did you?" There were three or four of them, all outrageous fabrications.

"No, I nexed into a few databanks."

That was a surprise. "No shit? Direct comp i'facing?"

She let out a long sigh. "It happens to be one of the two places I can live with any real comfort. Where I can lead my own life." I heard the bottle gurgle as she took a long swallow. I wondered if that other place happened to be inside a bottle. I hoped not. She passed me the brandy, went on talking.

"You've done pretty well for yourself. Son of AllMine contractees, raised in a company hab. But you managed to avoid getting contracted, got rich instead. You were owner of your own small shipping company by age twenty-two. You parlayed that into your own shipyard by the time you were twenty-seven. Hablord to thousands by thirty. A major builder of habs and ships by the time you were thirty-four. Your touch was gold. You could have stayed back there and gotten richer and more powerful—"

"Ain't that a sweet bit of truth!" I put in, passing the jug back to her. Obviously she'd studied me, and I had to wonder why. Had she come looking for me? And if so, what did she want? I had been swimming too long among the sharks—both would-be and pure-fin—long enough to know one when it started circling me. Whatever she was—and I wanted to know that more every minute—it wasn't greed that had brought her.

I could just make out the ghostly shape of her face by then, my eyes finally adjusting to the near-total darkness. I doubted she could see me—even if she were looking my way. Skin as dusky as mine tends to be a bit hard to see in the darkness.

She went on as if I hadn't interrupted. "—instead of losing money on this crazy scheme. Gesture. Whatever it is—"

She was finally looking my way then, but I had the feeling that she was looking for something in me, rather than at me.

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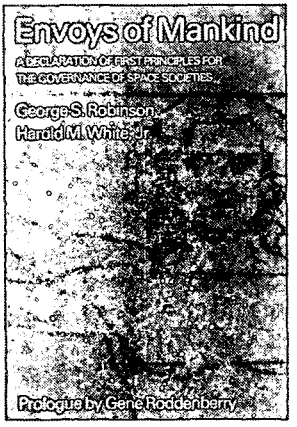
I can tell you that what she wanted was terribly important to her; it showed in her voice, in the face she didn't think I could see. But can I make you understand the incredible tension crackling between us at that moment? It was there, just as surely as there is enough electricity to fry you behind the signal that puts soft Mozart on your bedside comm.

I was pretty sure she wanted to know why I had invested damn near every spare cent I had in building the Kingdom—bars, restaurants, doctor's offices, swimming pools, schools, and all—tied up another fortune in CoatTail Station, taken the unheard-of step of building them with their own propulsion systems, and *then*, rather than opening up the mated complex and getting even richer, done the thing that made my nickname Crazy Eddie become the name I was known by, far and forever. Why did I have a half-dozen of my own tugs latch onto the mated double system to get it up to speed, crank up the big monstrosity's engines, and fly the damned thing—fully stocked and staffed, you understand—all the way to Jupiter's nearly-empty outlands after spreading the word that I was just moving it out along the Belt a few thousand kilometers? All this done under the kind of secrecy available only to someone willing to spend megabucks on bribes.

Now that's one helluva question. The answer is both ABC simple and wickedly complicated—not unlike myself, I suppose. It all started when I found out that AllMine had plans to send three new autofacs out to Jupiter orbit once they were finished. I knew that once AllMine was out there, with no one large enough to compete with or resist them, they'd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George S. Robinson
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take over like a piranha in a tank full of guppies.

I beat the bastards there by almost a full month.

The company bigwigs suffered what could only be described as Collective Tachycardia when they arrived to find me waiting with enough hab-space to house all their workers, space I offered for a fraction of AllMine's company hab-assessment. Contractees could only be forced to live in (and pay inflated assessments for) company cubic by circumstance—and usually were. But one of the few laws governing MuNat contracts was the Metzen Act, which forbade any contract from specifying that the contractee live in company cubic. The big MuNats let it slip by because—Hey, what were the chums going to do, live in their suits?

No, they could live with *me*. Presto, exodus. That nicked a vein and the Beast began to bleed.

Clever Eddie hadn't forgotten the upper-echelon managers, supervisors, and the like; no siree. For them I had bigger, better cubic than the jail-cells AllMine had for them, sans air and water assessments, and I also had pools, bars, a casino, and every other vice or enticement I could think of to sweeten the deal. That opened another vein.

Once I had a few mid-level VIPs installed in some of my tastefully bugged cubic, nullifying their countermoves became easier. I bribed, blackmailed, seduced, and sandbagged to keep one step ahead. I had booze, resturants, luxury goods both shipped in and grown or made on CoatTail; fresh vegetables, m&t weed, monkey copies of the latest sunward fads, and a whole stable full of samurai lawyers.

But *why?*

Once a ten-year-old boy heard his daddy crying and asked him why he cried. His daddy said that he was crying because he was in a box he couldn't escape, and he told the boy to use the brains God gave him the best way he could, and to never never *never* let himself get caught in that same box. I remember that boy cried along with his daddy and told him that he wouldn't get caught in the box, told him that he was going to get even, that he was going to fix those people who owned the box but good.

So OK, some of it was revenge, but not all of it. I'm a creature of impulse and intuition. I thought of the idea, I had the means, and I could no more resist it than I could forget it. Beyond that are reasons even harder to talk about than what passed between a boy and his daddy.

Well, if she had run the databanks she knew all the facts, and she was obviously intelligent enough to add them up into some sort of answer of her own.

So what was I supposed to tell her?

I did what I do more often than not. I just opened my mouth and said the first thing that came into my head.

"Anybody can lose money," I told her. "Very few people know how to do it so it's more rewarding than making money." True, but flip, and it ducked a whole barbed-wire snarl of questions which had given me more than one sleepless night.

I could make out that she was shaking her head. "You care very deeply about these people." It wasn't a question.

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"Well—uh, sure—" *Too much*, my accountants kept wailing.

She came and sat beside me. "I know. More than you would ever say. You want to help them now." She gave me a one-armed hug, then called the lights up. I sat there beside her wondering—hoping—I was about to be seduced.

"Now I want you to tell me everything." she said.

I know my face fell—it's a wonder I didn't get it all over my shoes. "Everything?"

"Yes. All about the Kingdom and CoatTail Station. About the ship AllMine seized, how it's configured, what was on it. About the people on both sides, good guys and bad. Supplies and reserves. Security. *Everything*."

"That's a—ah—pretty tall order."

"So is beating AllMine to Enceladus."

I was lifting the bottle of brandy to my lips when she said that. I almost dropped it. "You're joking," I managed to say at last.

She shook her head, her face dead serious. "You know better."

The hell of it was, I *did* know better. But it was all just a little weird to go down easily. Something inside me seemed to clench like a fist; it made me stare at her with a frown on my face, even though I wanted to charm her, not argue with her.

"You just turned up here this afternoon. You're a stranger with no stake in any of this, and yet you're talking about going toe to toe with AllMine. Why?"

She looked me straight in the eyes, and I had my first chance to see that I'd

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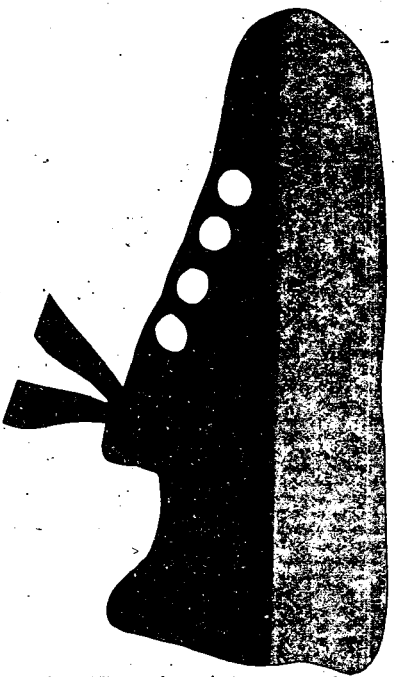

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only glimpsed the boundaries of the hidden. The walls lowered a little, showing me more of the hot and terrible something burning behind those pale eyes; something far hotter and more volatile than the drives and obsessions which had made me into Crazy Eddie.

"I have no choice in the matter," she answered softly.

I didn't argue with her. I couldn't. What she had just said rang as clear and as true as a gold coin on a marble table, that the driving force inside was telling her: *You can't turn away. You must do something about what you see even if you risk everything in the attempt.*

I could understand that; it had done much to make me Crazy Eddie. Sometimes choice just doesn't exist, and no matter how much you question yourself or have doubts about the strange task you take on, you know that you have to go through with it no matter the cost—because there's really only one answer. That answer comes out of a place so deep inside that it seems made in the bone, and you can't change it without tearing yourself apart.

I made myself nod. "Then neither do I."

She gave me a gentle, understanding smile. "I know."

I talked until I was hoarse, then talked some more. When she said everything she wasn't kidding.

Gemyn and I met with Rabo and Core late that next afternoon in my personal cubic. I led them all into my plant- and book-filled study, ushering them to a table set up in front of the vidwall, under

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the scrutiny of the madman's eye of Jupe's Great Red Spot.

Once we were all sitting down Core looked at Gemyn and me, her plain features wearing a haggard grimness. "Comp'ny set our kids loose," she said. I nodded. I'd already heard.

Rabo sat frowning at his feet, his wide, black-bearded chin resting on his barrel chest. He spoke without looking up. "Bastard Rickover *smile* when he call telling us. Gen'rous, he say, offense so bad it sign contract or be spaced. Kids even taken to airlock to make sure they sign. *Gen'rous*, he say. Four years probation an' three thousan' lab-hour penalty each one."

Rabo looked up at me then, lost and angry. "He come right out, say, 'You kids my *slaves*, old man, now an ever. Try cross AllMine again, I make sure they die in debt, just like *you*.' "

He closed his eyes and bowed his head. "Just like me."

Gemyn folded her hands on the table. "You said the original co-op was just under fifty families—maybe a hundred people. Is that all of you who would break free if you had a chance?"

Core shook her head emphatically. "No way! We just ones brave and far-ahead enough to take risk. Or maybe crazy enough to think we had chance. We dreamin' fools."

I said nothing. Gemyn went on with her questioning. I thought I knew what she was leading up to. I had a surprise coming.

"If a chance came along, how many miners, workers, techs, and the like would want to go along?"

"An' bust loose of the ever-deepenin' holes they call they contracts?" Core snorted. "Damn near ever one."

Gemyn's face was bland as she said, "Then we'll just have to *take* damn near everyone."

Core sat back, crossing her arms and searching Gemyn's face carefully. Rabo's head snapped up and I heard him softly repeating what Gemyn had said to see if he had misunderstood.

I must admit that I reacted badly; Gemyn's little bombshell had been news to *me*.

"Wait one damn minute!" I yelped, "What the bloody hell are you *talking* about? I could see where maybe we could—uh—reappropriate that ship and get it on its way to stake the claim before AllMine, but *everybody?* Just tell me how the *bloody* hell you figure we can do that?"

Gemyn gave me a smile that must have looked like the one I gave my Chief Accountant when I told him about my plan to build the Kingdom and CoatTail. I only hope I didn't look as idiotic as he did—all goggle-eyed and gaping-mouthed as a goldfish dropped into a bowl of straight vodka.

She seemed to be enjoying my upset; she was the happiest I'd seen her. Even in my anger I couldn't help noticing how beautiful she looked wearing that smile. She seemed to *glow*.

"We're taking everything, Eddie," she said. "The Kingdom. CoatTail Station and its autofac. The ship. *Everything*. We're going to slap the whole mess together and take it out across the Big Empty, out past Ixion Sation, and get to Saturn's moons before them.

I could only stare at her. "Just like that."

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Her ice-chip eyes sparkled with merriment. "You catch on fast for a bartender."

It was obviously impossible; any fool—me for example—could see that. "Listen," I said, starting to get mad. "Didn't you hear anything I said last night? If I hadn't had the tugs I would have used up all my fuel just getting the linked Kingdom and CoatTail up to speed! It's *huge*, for chrissakes! We don't have any tugs. We can't hold enough fuel for the whole trip, and even if we could, this thing's *slow*, and . . ." I had jumped to my feet. I was pacing and waving my arms as I yelled.

It was then that I heard Gemyn laugh for the first time. It stopped me in my tracks and jerked me around to stare at her.

"What's the matter, Eddie dear?" she asked sweetly. "Don't tell me you're getting *cautious* in your old age. Have you got all settled in and sane?" I sagged, unable to even *begin* to figure out how to argue with that. I turned toward Rabo and Core for support.

Rabo was frowning and scratching his beard. "She say we take damn near AllMine's whole work-force, Eddie," he said slowly. "Every tech an' miner, maybe third of supers, maybe dozen or more higher up an hurtin' like us."

Core was grinning like a shark at a meat-market. "All gone at once. *Bam!*" She slammed her first into her hand. "We rip guts an' muscle outta comp'ny's Jupe holdins' with one yank. If Old Shit Rickover wants ores an' ice, he gotta go grub it up hisself!"

I felt like I'd gotten trapped in a weird nightmare where I was the only one with feet on the ground while everyone else was swimming through the air above me, giggling and pointing because I remained ground-bound. I started yelling again.

"Wake up, you people! Aren't you *listening* to me? I built this bloody thing, got it this far! I *know* there's no way to do what you're dreaming about!"

Gemyn got up, then came over and put her arm around me. "But there is, Eddie."

I wasn't so upset that I was going to shrug her arm off. I managed to lower my voice, begging rather than yelling. "Then *how*, dammit! *How?*".

She kissed my cheek. "I haven't worked out all the details yet," she answered mildly, "But I think AllMine's going to help us get there."

Then she clammed up, refusing to tell us any more of what she had in mind. She asked Core and Rabo to get in touch with all the other co-op members and have them contact everyone they thought would go for it. The doubtfuls were to be left out of it for the time being. They were to plan on a meeting at the Other Lode at 1900 hours the next day.

They headed out, carrying new hope inside them. Gemyn left right after they did, refusing to answer all my questions, and lingering only long enough to ask me to come to her room at 2400 hours.

Then she left me there all alone. I wondered if she planned to try to use sex to convince me. I swore to myself that it wouldn't change my mind if she did, but I knew it was only fair that she be given a chance to present her case. I've always been a fair man.

She had to be kidding or mistaken. Lacking tugs, lead time, and everything

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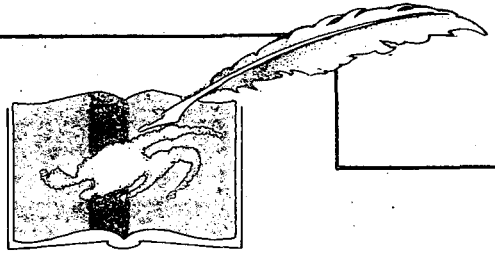

About L. RON HUBBARD's

Writers of the Future Contest

by Algis Budrys

The Writers of the Future contest substantially rewards at least twelve talented new speculative fiction writers each year. With no strings, every three months it confers prizes of $500, $750 and $1,000 for short stories or novelettes. In addition, there's an annual Master Prize of $4,000. All awards are symbolized by trophies or framed certificates, so there's something for the mantelpiece too.

There's also a Writers of the Future anthology, which I edit. (There was one last year, and there's another one just out as you read this.) It offers top rates for limited rights in the stories. These payments are in addition to any contest winnings. The anthology is distributed through top paperback book retailers everywhere, and is kept in print and on sale continually. All that's required to win or to be a finalist is a good new story, any kind of fantasy or science fiction, no more than 17,000 words long, by writers whose published fiction has been no more than three short stories or one novelette. Entry is free.

The contest deadlines in 1986 are March 31, June 30, and September 30, and there are First, Second and Third prizes for each three-month quarter. At the end of our year, a separate panel of judges awards a Master Prize to the best of the four quarterly winners. So one person will win a total of $5,000. Judging panels include or have included Gregory Benford, Stephen Goldin, Frank Herbert, Anne McCaffrey, C.L. Moore, Larry Niven, Frederik Pohl, Robert Silverberg, Theodore Sturgeon, Jack Williamson, Gene Wolfe and Roger Zelazny, as well as me. Matters are administered so that the judges are totally independent and have the final say.

It seems hardly necessary to embellish the above facts with any enthusiastic adjectives. This contest was created and sponsored by L. Ron Hubbard and the project will continue in 1986 and try to do some realistic good for people whose talent earns them this consideration. For complete entry rules, and answers to any questions you might have, write to the address given below:

Don't Delay! Send Your Entry To:

Writers of the Future Contest
2210 Wilshire Blvd., Suite 343
Santa Monica, CA 90403

Or, you can find the rules—and examples of winning stories, plus informative essays by some of the judges—in either of the Writers of the Future anthologies. They're original paperbacks and cost $3.95 each.

Good luck.

—Algis Budrys

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else, there was just no way to get the Kingdom out there. It was even slower than an autofac, and they were damned slow, using a long low-g constant boost to get from place to place.

And AllMine helping us get there? Sure.

It was all too confusing. So I did what any rational person in my place would do. I sat there staring at the roiling, restless surface of old Jupiter, drinking steadily and wondering just what the hell I'd gotten myself into this time.

Military time be damned, everybody calls 2400 hours midnight. Midnight is still an uneasy hour; even now we still associate it with fear and horror. But that night the only terrors I had in mind were the prosaic ones a middle-aged man sometimes feels when going to the room of a beautiful younger woman. Happily, those were fleeting.

Gemyn's door was partly open and the lights were on. She didn't answer when I called her name. I pushed the door open and stuck my head in.

She was in the tan coveralls I'd last seen her wearing, and she lay sprawled on the bed like a slaughtered animal, face-down and still as death. I lurched through the door, dropping the stuff I was carrying, visions of company security working her over filling my head.

I reached the bed, and a closer look told me that she had not been harmed. She was breathing—shallowly. I had to assume that she was all right.

But what I was seeing was far from right with me. The feathers of black hair at the back of her neck had been brushed aside, revealing a large, complex, evil-looking black and gold socket set in the base of her skull. Wires snaked out of the socket and were jacked into the desk omcomm, which had been pulled close to the bed.

The sight of that thing in the back of her neck set my gut rolling in revulsion. I turned away feeling sick, my gaze falling on the omcomm's screens. It was a two-screen model, and both were flashing and changing too fast for the eye to follow. I caught brief glimpses of course-plots, long rows of numbers, diagrams, blueprint frames, log entries, and a hundred other things there and gone too quickly to be identified.

Then one screen blanked, the other continuing its mad scanning. A single line of print appeared: HELLO EDDIE. I'LL BE WITH YOU IN A MINUTE. SIT DOWN; MAKE YOURSELF COMFORTABLE.

I sat down all right, ending up on a corner of the bed as my legs turned to jelly under me. I went cold all over and had to swallow hard to keep my dinner down where it belonged.

I had heard of nexing, she'd said she could nex, but I'd never had to deal with it face to face; and now that I had to, I was flunking the test badly.

Tapping had always been a kind of phobia with me. A lot of people had taps, mostly techies, spacers, and other heavy comp users, but you would have had to put a gun to my head to make me get one. Compared to nexing a tap is nothing; it's like a small closed window that lets you see into the comp a little and lets the comp see into you a little, but *only* a little. It's passive; there's that nice pane of glass keeping *it* out and you in.

Nexing is something else altogether. If your mind is your castle, nexing is

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like opening all the gates and windows and letting down the drawbridge, tearing off the bloody roof and pushing over all the walls. Nex and you are swallowed up by the machine. Worst of all, the machine invades you and you become one with it.

I had found Gemyn a beguiling enigma. She attracted me more than anybody I had met in many long, rather freewheeling years, and to tell the truth I had been experiencing all the Classic Symptoms of being badly smitten. But seeing her lying there wired up in an obscene mental embrace more intimate than sex with the subhuman alien intelligences we keep in our machines —*coupling* with them—made something sweet curdle inside me.

A word my Bible-thumping Aunt Jess used to be overly fond of scrabbled around and around in my brain like a trapped rat. That word was *abomination*. At that moment the thought of touching Gemyn made my skin crawl.

I screamed when she touched me, leaping up off the bed like I'd been bitten. The thing squatting inside her wanted *me*, I was sure of it. I spun to face her, my heart trying to hammer its way out of my chest.

She had rolled over and sat up watching me, the wires plugged into the back of her head draped over her shoulder like a ribbon-cable ponytail. Her welcoming smile faltered when she saw that I was more than simply startled. "Sorry," she said. "Are you . . . all right?"

"Yah." I couldn't take my eyes off the wires. It was as if I were terrified of snakes and those were live rattlers draped over her shoulder, hissing and eyeing me before slithering my way.

"I see," she said. Something like sorrow crossed her face before she could hide it behind an impassive wall. Her eyes dropped and she looked somehow smaller, diminished, as she reached back and began unhooking herself.

I had to look away. Aside from the way it made my gorge rise, it somehow smacked of an obscene intimacy. To cover my upset I retrieved the things I had dropped on the way into the room. I opened the box of pastries, finding them as battered as my dreams of seduction, and put them aside. The thermos was unhurt, though, and I poured out two cups of real coffee made from gold-precious beans grown on CoatTail. When I turned to hand her a cup she was just finishing packing the cables away in a small plastic case.

Gemyn accepted the cup, nodding her thanks. She looked up at me, searching my face. "Please don't dwell on it," she told me gently, "It's all right. I understand."

I couldn't meet her gaze. I stammered something unintelligible. Then I shook my head, feeling stupid, ugly, and completely wretched; knowing that I had hurt her. That I had let her down. "I'm sorry," I managed to tell her at last. "I'm all right now."

"Look at me, Eddie." I did, hesitantly. Somehow she pulled a reassuring smile out of herself. "I'm sorry, too," she went on. "I never would have let you see me like that if I'd known you would find it so repulsive. It's going to make things harder, but we'll get by somehow."

I opened my mouth, but to this day I don't know what I could have said.

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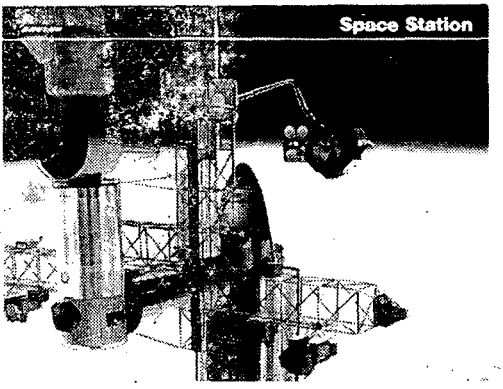

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Gemyn put her fingers to my lips, shook her head.

"That's not important right now. What is important is what we have to do."

I knocked back some of my coffee. It was scalding hot, burning my mouth and tongue, searing my throat. Yet I kept gulping it. I guess I was making myself perform some sort of penance. I drained the cup, my eyes watering, then said, "Tell me."

And she did. Twice to make me understand what she had in mind, once more to make me believe it was marginally possible, and a final time to get me to agree to go along with it.

I resisted it for reasons which will become clear later.

Seven of us met early that next afternoon: Core, Rabo, Gemyn, and I, plus my Chief Tech Kent Yang, head of Kingdom Services Luz Aguilar, and Red Flanagan, another of the co-op's prime movers.

Kent and Luz were all for it. The Kingdom was their home and the Kingdomites were their friends; neither was daunted by the prospect of moving the Kingdom. Red scratched his head and allowed how he might enjoy a better ring-side seat, Jupe's ring being kind of puny.

Core had already made up her mind, and hearing what Gemyn had in mind changed nothing. Ever since that moment of their strange meeting back in the Other Lode, Core seemed to trust and intuitively understand Gemyn. Rabo's trust was almost as complete as his wife's. Any shortfall was more than made up by his complete and loving trust for Core.

Things weren't quite that simple for me, nor would they get any simpler. I went along, carrying my doubts inside as best as I could.

I had to bang on the bar for quiet. It had been moved back against the Other Lode's far wall, in front of the door to my office. Nearly three hundred people were crammed inside, and close to two hundred more jammed the corridors outside. I had some of my people working the edges of the crowd, telling everyone to go home and watch the proceedings on one of the inKingdom channels, and watching for spies and troublemakers. It was a sure bet that none would survive inside the crowd.

I banged again. Little by little the thunder receded to a roar, then a rumble, then the sea-murmur of people shushing each other. We sat atop the bar, Gemyn on one side of me, Core and Rabo on the other. Clearing my throat to silence the last whisperers, I launched into my spiel. Repeaters carried my words to those in the corridor.

"You all know me," I began, and got no further because of the ragged cheer that went up. It was nice to be appreciated, but we didn't have time for it just then. I roared at them to *shut up!* They did, taken aback.

"Sorry," I told them, "but this is too important for vecting around. I want all of you to listen closely now. You all know about the co-op—I can see quite a few of you who belonged to it. Well, you know what happened, how AllMine got wind of it, ripped the ship, phonied up charges against everyone on it, how

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they're rubbing your noses in it by sending one of their own autofacs out to Enceladus to take over the claim your people had surveyed and hoped to make.

"You're all angry, and rightly so. Even those of you who didn't belong to the co-op were counting on it, hoping for some proof that it was possible to escape AllMine. All that was lost, and up until a couple of days ago I would have said that there was precious little you could do about what happened.

"Well, that's all changed now. There's a way out, a way to get better than even. It's risky—hell, it's totally *crazy*—" I was drowned out by laughter and a scattering of applause. One or two people yelled *You should know!* "—but with a lot of work, more luck than I care to think about, and the help of each and every one of you, it just might work. Work in a big way."

I took a deep breath and dropped the bomb. "We're going to Enceladus. We're not just talking about taking fifty-sixty people this time. We plan to take everybody who wants to kiss AllMine goodbye. *Everybody!* We're taking the Kingdom, CoatTail and its afac, the ship AllMine ripped, and every blessed miner, tech, and contractee who wants to go. There are even a few marginally human supers and managers who can come along if they want, and we won't even make them ride in the back!"

There were a few isolated hoots and catcalls, but for the most part a stunned silence reigned as they tried to absorb what I had just told them.

That was Red Flanagan's cue to stand up. The wrinkles and laugh-lines on his long thin face were arranged in a puzzled look.

"That sounds all well and good, Eddie-lad," he called out, putting his hands on his hips. "But how the bleedin' hell are you going to do this wonder?" He scratched his red thatch theatrically.

Red had been the one to suggest that the Hard Question be brought up by one person rather than a mob. That way, if I could seem to get him to agree to my non-answer, then maybe the rest would go along and we could forestall a riot. As a father of five—three by his present wife Lara and two from a previous marriage—he qualified as our riot control expert.

He had done his bit and there I was, right up against the part I had been dreading. They had to accept what I was about to tell them, but it was going to go down hard if they swallowed it at all.

"Well Red, we have a way figured out, but I'm afraid that I can't tell you what it is." The noise in the Other Lode rose sharply.

"*Why?*" Red bellowed, still trying to act as spokesman. I held up my hands for silence, but had to shout above the spreading uproar.

"There are *reasons* for that! Good ones! The first is if I told you about it I'd need a month to convince you it would work! The other is—*will you listen, dammit!*—the other is *security!* AllMine stopped you once, *do you want that to happen again?*"

I was wasting my breath. The room was in chaos, everyone shouting, no one listening. There was just too much pent-up frustration for that to go over, and I couldn't really blame them. Red spread his hands and sat down, his face even longer than usual.

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I turned toward Gemyn, to apologize for the way they were acting, I guess. She was gone. I turned the other way, nudging Core. She looked past me and seemed unsurprised at Gemyn's absence. Then she sighed heavily and climbed to her feet on the bartop.

"All right you, damp it." She hardly raised her voice, yet one by one people sat down and shut up. They all respected her.

"Better now." She looked out over the sea of faces, her plain, careworn face serious. "You know me, all you. My kid Glen, I fight my whole life to raise him good, to keep him out of AllMine's hands. Well, they *got* him now, an' less we do somethin' he's never gonna get free of 'em, no more'n you, no more'n you kids. He just more meat for comp'ny's grinder, one more of us to use an' toss.

"You risk you lives, all you, minin' th' ice, minin' th' ores, minin' th' carbchon, workin' the machines. For *what?* I tell you for what, it just to scrape by 'nother year, to get squeezed harder, to work til you *drop;* still behind after all you years makin th' steel in you own chains! You contracted, then truth is you *owned!* You risk youselves but don't even *own* youselves! That's you contract!

"Well, I say better you risk you lives tryin' to get free! You lives always ride the dice-roll, so better you take 'em into you own hands, roll 'em in a chance to get free, to get you kids free, an' maybe they kids after think AllMine just boogeyman from old scary story! Think, all you, *think!* What you got to offer you kids now? Nothin' but same chains draggin you down! No gift, a curse! Think you on that! Look true an' hard, put aside th' lies helpin' you get by!"

There was no shouting now. The air seemed to ache with silence. Core frowned down at them, their own rough prophet with callused hands and patched coveralls, daring them to truly think about their situation and the bleak heritage of their children. They had no choice but to obey; her passion burned with the clean clear heat of the sun's fires. It filled the room and touched every one of them. Rabo sat beside her, one thick arm protectively wrapped around her leg, staring up at her with such awe and such love wreathing the bearded crags of his face that it brought a lump to my throat and I had to look away.

Core shook her head from side to side slowly, and every eye she met looked down in shame. Her expression softened.

"We got us a chance now. Don't matter *how,* hear me? I know the how, an' it sounds crazy, sure enough! But that lady was up here with us, you drive her away with you carryin' on, *she* figure out the how, she can make it work! *I* believe her! My Rabo and me with her all the way!

"Hear me now, all you, what she gonna do gonna *hurt* her—hurt her real *bad!* But she don't ask why, she don't ask who you people to *me,* she willin' to try this thing even though it maybe *kill* her! So don't make me 'shamed, whinin' and cryin' you *'fraid!* She's 'fraid, but still she gonna do for all us somethin' so big an' hard it make old Jupe look like little Leda!"

Core brought up one hand to eye level, closed it into a fist.

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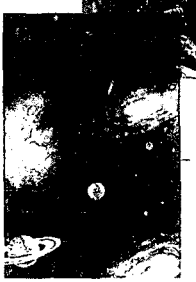

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"We got us a chance here, I say we take it! My Rabo feels same way, an Eddie's gonna risk ever thing he got to help us!

"So bottom line's here, this: Put you why and how by, they don't mean *dust!* Grab this chance to stop bein' slaves! Stand youself up an say *I'm* gonna be free! My *kids* gonna be free! Say I don't care how, if I gotta crawl through fire to bust loose of compny's hold it don't matter 'cause *from this day on I'm gonna be free!*"

Rabo jumped up beside her. "*Free!*" he roared, hugging Core fiercely. He planted a rough kiss on her cheek, then turned to face the crowd, shaking his big fist at them. "*Tell her!*" he bellowed.

"Free—" The cry was a hesitant mumble, as if they were tasting the word for the first time.

"*Free!*" Stronger now, men and women standing up, their faces uncertain and amazed as hope and conviction lit inside them.

"*FREE!*" They were all on their feet. The shout was like thunder—no, like the ignition of some great long-dormant engine, awakening in fire and setting some tremendous thing in motion.

I slipped back behind the bar and went looking for Gemyn.

Because of the crowd there was only one place she could have gone. She was in my office behind the bar, huddled in the far corner with her hands over her ears. I was surprised and unnerved to see that she was shaking and weeping like a lost child.

I went to her and knelt before her, uncertain about what I should do and baffled by such terrible, seemingly reasonless anguish. At last I put my arms around her, drawing her face to my chest. She clung to me with the desperate ferocity of someone drowning in deep dark waters. I held her, made soothing sounds, stroked and patted.

Slowly her racked breathing softened, she no longer gasped and jerked like someone being scourged. I kept up my comforting, feeling clumsy and useless. Like most men I was all but helpless trying to deal with tears—especially a woman's tears. I was sure I was doing none of the right things and half-convinced I was only making things worse.

And like many men, such a situation put me in a state of guilty arousal. I tried to ignore it. But somehow she knew.

"Yes," she whispered in my ear, still holding on as if to keep from being pulled under. "Please—"

Some time later, after a sweeter desperation had reached its crest and ebbed, I smiled at her and asked, "Do you think we could lead the whole—ah—parade this way?"

"Batons aloft, you mean?" Her smile faded. "I gather from the shouting and singing that we have a lot of work ahead of us. We better get to it." She disentangled herself from me, sat up and stretched, turning the tautly-muscled arch of her back toward me.

"That's it?" I demanded, my contentment ripped right out from under me. "Wham bam, thank you man?" I got to my knees beside her, putting my hand on her shoulder. "Just who the hell are you, anyway? One minute you're this tough spacer, the next you're crying over someone you don't even

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know, right after that you turn yourself into a goddamn machine and plan a bloody revolution—taking a part you could *die* from—right after that I find you hiding in a corner, hysterical for who knows what reason, and then—" I took a deep breath, "—I mean you keep changing so fast I never know who you are or what you'll be next! What is it with you? What are you?"

She sighed, slumping over and avoiding my eyes. "I wish I knew, Eddie," she said in a small voice. "Maybe a spinning weather-vane, ever answering to the wind. Maybe I'm a chameleon caught in a kaleidoscope. That's how it feels."

I couldn't accept that as an answer. "These scars, for instance." I traced one faint puckered line which started somewhere in the untouchable territory of her nex-tap and ran down the center of her spine; just one of the web of similar scars she bore on every part of her body. "Were you soldier?" Bioptimum implants might leave scars like that.

She turned toward me at last, her face as bleak as Io's airless wastelands. "No, a criminal. A *killer*, among other things. I got those scars when my body was peeled away from my brain and nervous system like a grape peeled away from its seed. My body was put in storage like meat—doesn't *that* make me desirable?—my *me* was nexed into a huge survey probe and I was sent off alone, with only an insane comp-copy of myself for company to contemplate what a viscious, unfeeling bitch I was, and to change. I spent two years as a giant steel spider, scuttling from rock to rock, and I—"

She drew a ragged breath. "No." She pulled away from my hand and got up from the pile of cushions we had used for a bed. "Get up and get dressed. We have a lot to do and very little time."

"But—" But every answer you give me leaves me knowing less, confuses me more.

She threw my clothes at me. "No buts. No time. If we can pull this off then we'll have lots of time." She looked down at me imploringly. "Please be patient with me. I need time."

I couldn't refuse her. Even though the longer I knew her the less I understood her, I'd go along and try to accept her on her own terms. I had little choice in the matter. After a 46-year lifetime of entanglement-impervious bachelorhood Crazy Eddie was suffering from that sneaky form of brain-damage known as love. Gemyn's mysteries and contradictions made things harder for me but didn't drive me off. I was in her orbit, as the old saying goes, for better or for worse.

So I got up, glaring at her. "You got time," I told her grumpily. "*I* happen to need coffee."

Her grateful smile was thanks enough.

We had a bit over four days of finessing and finagling, of planning, replanning, arranging, and just plain hassling. The sheer mass of details we had to deal with was enough to make you want to crawl off into a quiet corner with a full bottle so you could drink yourself into a little peace and quiet. Rabo, Core, Gemyn, Red, myself, and about two dozen hand-picked others—not counting my staff—were at the center of the storm, working around the clock.

On the AllMine front, shift-work

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went on as usual, with some pulling doubles to ghost for those we had otherwise engaged. We had a woman, Tamara N'Goro, in AllMine's scheduling office; she made many things possible. Everything had to seem to be proceeding normally so that any rumors which might reach AllMine's upper echelons would be discounted.

I could go on for hours listing the details, the close scrapes, impromptu subterfuges, misdirections, and glib lies—such as the one that I was throwing a big party for the contractees on autofac launch day—the subversion of systems and out-and-out theft of materials and equipment. If it all sounds easy, go read one of the good histories (I recommend the one Tamara wrote) and learn the truth.

If I seem to gloss over all but a narrow band of what went on—and I do—it is because there is only one story I'm trying to tell here: Gemyn's. She was the axle around which it all turned.

Gemyn's story now had me written into it, my life and my fate had become inextricably entangled in hers. Because of her I was putting the Kingdom in the pot, and because of that we were rushing toward a point where she would ante up her life.

That circle was part of a larger circle, one as paradoxical, perplexing, and complex as only human relationships can create; she had been drawn into the troubled lives of the people of the Kingdom and they, each and every one, had become as deeply enmeshed in hers.

Dog tired and detail-blinded, we made it to the evening before the big day. By then most of our activity was being coordinated from the Kingdom's main control compartment. Just in case you're a little hazy on how the Kindom was configured, let me explain how it was put together—or at least try to.

The main body of the Kingdom was the ever-popular cylinder, a bit under half a kilometer in diameter and roughly twice that long. That may sound big, but the place was designed to be spacious, and when I said I put everything I could think of in it I meant *everything:* game courts, three swimming pools, even a park—trees, flowers, bushes, benches, birds, and all. Even a hadog stand.

Anyway, all the habs, bars, offices, and the rest are in that cylinder, which is spun to provide the usual fake gravity, riding on a magnetically cushioned axis over twenty meters in diameter.

Aft of the main cylinder a brawny, four-armed, starfish-shaped structure is attached to the axis. The arms extend way out past the cylinder body and form the outriggers for the Kingdom's four huge LSI (Low Specific Impulse) drives, which put us somewhere between the snail and turtle classes in terms of speed. Big bulbous fuel tanks swell out from between the starfish's limb-joints. At axis center is the locking dock for CoatTail, and partway out along the arms the lugs for CoatTail's locking buttresses. Inside each arm, just behind those lugs, is a small WuFusion unit.

Two dozen docking nacelles—which also house the spin motors—protrude like spines from the outside of the main cylinder, in between the solar arrays and sunlenses. They aren't rigidly fixed, in case of any disastrous docking errors, and the locks are set up so any docking

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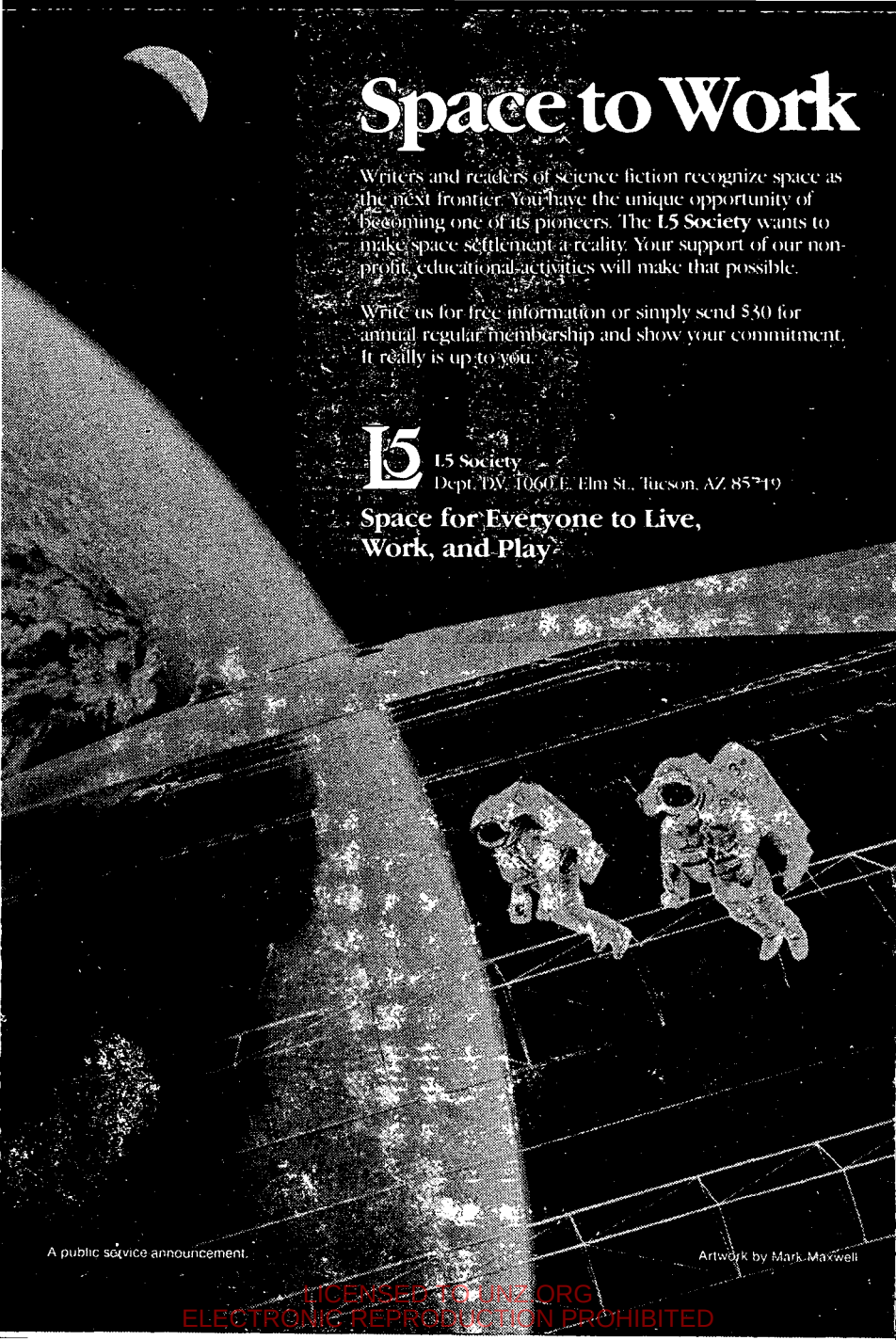
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craft is oriented to the Kingdom's local down.

Attached to the forward (front) end of the axis is an eight-pointed starfish; the arm-ends house the deflector field pods. Farther in along the arms are the big towing lugs, three per arm, and between them extra locks and the work-pod bays. The control compartment is between two arms at the edge of the central axis. The axis is decoupled only under thrust; when orbiting the compartment is oriented to local down. Accelerating, it rocks up and aft is down.

As you can see it's an ungainly mutant thing: not really a ship, even though it has more than the usual station-keeping drivers, yet possessing the decoupled axis of a passenger cruiser. Hagbard of Ceres, its designer, wanted to call it the Poor Confused Bastard. I figured it had enough of an identity crisis without being saddled with a name like that.

That control cabin—which Hagbard had designed to look like a turtle's head—had only been Tech territory since the Kingdom made orbit. That orbit wasn't particularly stable, and the place's critical operating systems were in constant flux, but the comps did most of the work under the watchful eyes of my diminutive Chief Tech, Kent Yang. Kent had been with me for years, a quiet little mandarin monkey of a man who knew Tech like his ancestors knew duck sauce, a child of the Heavenly Peace enclave on Mars.

Kent's domain had been invaded in the last few days, not that he would have been inclined to put up a Great Wall to keep out the Foreign Devils. At this early evening hour there were perhaps a dozen people working at the various consoles and omcomm boards in the horseshoe-shaped compartment. Kent and Gemyn were working side by side, running checks on some hasty reprogramming of the main comps. Gemyn was sitting and Kent standing—which made him an ace taller.

I had just finished another staff meeting and was between jobs at the moment, feeling jittery and useless as I watched the two of them working. I can't even program my omcomm's alarm-mode, for God's sake. Clearly labeled buttons are challenge enough for me.

Rabo lumbered in, grinning hugely. He looked like a bear who'd found a hunny-tree. "Hey Eddie," he said, "AllMine afac lines in place, slick like ice."

"You're *sure*," I demanded, still feeling fretful.

He laughed, clapping me on the shoulder. "Am sure, my friend. Some schedule changes in afac's final check-out crew made it all our peoples. Our riggers installed remote-triggered drums an' monomo cables, even had the two supers and three quality c'trol 'geers we put in place for check-out inspect job rather than look other way. They good people going with us."

"They must have wondered why we wanted such a set-up." I said.

"Oh yeah. But they won't say nothing. They gave Comp'ny report that all is as should be. No big-shots gonna climb in stuffy suit to go look at stuff they don't understand. Unless they send last-minute check-out crew we in clear."

Gemyn turned from her terminal. "Kent has the comp monitoring the

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work channels just in case. The ship ready yet?"

Rabo nodded. "Miri Whiting in Transport send it to Eddie's fuel dump near CoatTail. Her tanks full and ever cubic of holds should be full likewise. Is tanker on sked?"

Gemyn faced the screen and tapped a couple keys. "ETA in about an hour." She turned back toward us. "You have a crew ready?"

Rabo beamed with pride. "Sure do. My Glen on that crew. Job will be done damn right."

"I'm sure it will," Gemyn told him, her face reflecting Rabo's smile. "You better grab a commboard and call Core, Red, Daniel, and the others. It's time to start bringing everybody in."

"On my way." Rabo gave her a mock salute then went to find a free board. Gemyn turned my way, the smile fading from her face. I couldn't help noticing how tired she looked. There was no help for it, we had all been run ragged, but she had carried the greatest part of the weight and it was showing. She was scheduled to rest soon, and I intended to see that she did. Too much depended upon her having a clear head.

"Are you all right?" I asked.

She sighed. "I have to be, don't I." She rolled her shoulders to loosen them. "Kent's ready to go. Time for you to start pushing the undesirables overboard."

"All right. I—" I hesitated, unsure how to express what I wanted to tell her. I caught her hands in mine, then said, "If you need me I'll be close by." That wasn't what I meant to say. I wasn't even sure what I wanted her to know.

"I know," she said, bringing my hands to her lips. Some of the tension had left her face; her gray eyes were clearer. She let go of my hands. "You'd better go." She turned back to her work.

I commandeered the main omcomm board, over in its own little open cubicle stuck in the left-hand back corner of the compartment. My job was to evict all the hard-core company people on board. I had them segregated in one section of one level, all in lushly furnished, extravagantly-bugged quarters.

With Kent's help that whole section lost its heat and developed a severe air problem. Not long afterward I was deluged with calls from outraged tenants. Each one was given a politely abject apology, and a well-rehearsed song and dance about a bad systems glitch. All were asked to crib with AllMine for the night and told they would be given a free month's cubic to compensate for the inexcusable inconvenience. They were directed to buses I had standing by, each stocked with free wine and booze to help smooth their ruffled feathers. The rooming arrangements had been made through one of our people. My stewards and stewardesses had been instructed to see to it that by the time the buses arrived at the lower orbiting autofac they were going to, no one would be sober enough to tell a coherent story.

I was in the middle of one of the last—and nastiest—calls when I felt a hand on my shoulder. A glance at the clock told me I had been at it almost four hours. No wonder I felt so wiped out. I put the call on hold and turned around.

It was Gemyn. "Eddie?" she said in

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a thin, uncertain voice. Her face was tight and shiny, like someone who was about to be sick, and the hand on my shoulder trembled. "Get me . . . out of here . . . I can't—" She shook her head. "Too strong—"

I took a quick look past her, surprised to see that the compartment was full of people. Core and Red had arrived somewhere along the line, along with some dozen others. Every console was in use, people were coming and going constantly. I had been so wrapped up in what I had been doing that I hadn't even noticed, had been totally oblivious to the noise and frantic tension in the air. I managed to catch Kent's eye and call him over.

I got up and he slid into my still-warm chair, giving me a big grin and a thumbs-up before taking the small, screaming, red-faced figure off hold. Taking Gemyn by the hand, I led her to the small cabin at the back of the compartment, put there for the Pilot's use on the long trip out. She followed me, moving like a sleepwalker and wearing the face of a zombie.

We went in and the door slid shut behind us. The moment it closed Gemyn moaned and sagged against me, nearly falling.

"Tell me it will work, Eddie." Her voice was small and choked. She sounded near tears. "Tell me everything will be all right—"

She caught me completely off-guard. I stared at her, pushing her back to hold her at arm's length. "We're following *your* plan! It can't work without you! Are you trying to tell me it *won't*—"

She pulled away, stumbled to the bunk, and dropped down onto it. She held her head in her hands, looking so small and forlorn that I felt like a monster for having raised my voice.

"Can't you *feel* it?" she said in a voice so low I had to move closer to hear her. "It's sharp as knives—"

I put my hand on her shoulder. She looked up at me, her face pale and pinched, her eyes dull and lifeless. She looked like a prisoner pulled out of some deep dark cell on execution day.

Her mouth worked soundlessly, then she whispered, "Can't you feel the hope inside them? It's strong, so strong, but—" She hid her face in her hands. "But not as strong as their fear, that's alive and *hungry*. . . . They're terrified, most of them, there's fear h-howling out of them. They're holding it back the best they can, but it's too *strong*, I can't shut it out, it's howling l-louder as it leaps and scratches at the walls of their hope and can't you *hear* it? It's a battle, a storm, and they look at me so hopeful and so afraid and they're tearing me apart . . . ripping me down the middle . . . burning me and bleeding me and I . . . can't. . . ." She began to cry, moaning *I can't, I can't*.

I sat down beside her, struggling to understand. I put my arm around her. "You . . . hear them thinking?"

She shook her head, huddling against me as if I could protect her. "Worse . . . I *feel* them, feel what they feel, can't shut it out, can't keep myself in one piece, it's tearing me *apart!*"

Yes, it crossed my mind that maybe she was crazy. The wild mood swings, the cryptic references to life as a giant steel spider, her erratic behavior, the fire that I knew burned inside her, and now this incoherent talk of being torn apart

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by what people were feeling—was it madness?

Some of the older peoples of Earth thought madness the result of a person's being entered by the gods, by a God. We're quite certain we know better than that now. But what if that "God" was a thought, an idea or ideal, a pure love, a vision of how things are or ought to be . . . or an awful, razor-edged sensitivity; a terrible acuity whole orders of magnitude greater than everyone else's? Some of those mad ones are poets and artists. We call some others saints, and we understand them even less than we understand ourselves.

What would it be like to be unable to keep from feeling what those around you feel, to have normal empathy so magnified and amplified that another's sorrow becomes your grief, another's fear your terror? Could you lead a life of your own? Could you stay sane?

How had she described herself? A chameleon caught in a kaleidoscope. A spinning weather-vane, ever answering the wind. I saw her as a kite and wondered how she had endured the kite's life, helplessly riding the ceaseless, gusty winds of the emotions of others; sheering across the cold northerlies of anger, straining string-taut against the hard easterlies of despair, dancing to the sultry southerlies of arousal, being lifted then flung down toward a strut-shattering meeting with the ground on the uncertain draughts of mixed hope and terror. Twisted, turned, spun about . . . volitionless yet aware, dipping and soaring, *driven* . . .

I wondered if that could be how she had ended up in the high, uncertain place she now crouched. Had she been caught in the gales of despair coming from the contractees and blown deep into their troubles, past any hope of escape? *I have no choice*, she had said.

Yet she fought, rather than let herself be overwhelmed.

Suddenly many things became clear. I gathered Gemyn into my arms, my mind awhirl with those thoughts and a hundred others too formless to articulate. And in that moment something else became clear.

I realized that now that I had my half-answers they meant little after all; that the questions and qualifications I had hung onto were nothing more than defenses against the simple truth that I loved her, that I had faith in her no matter who or what she was. Lacking Core's simple honest directness, I had needed to take my own slow stupid circuitous route to trusting her and accepting her as she was.

She might still be mad—certainly her plan was—but as Core had said, it didn't mean *dust*. When not pursued by her personal demons she had said that her insane proposal would work. So be it. I told myself to focus on that belief and discard the rest. If she had been driven to doubt herself, then I had to lend her *my* belief—something I realized that I had been doing all along in my backward, wrong-headed way. By not pushing. By being a buffoon.

"Hush," I told her, taking her tear-damp face in my hands and staring into her eyes, trying to fill them with hope. "Tomorrow you make history as the greatest juggler of all time. Tomorrow you part the seas so a people can break for freedom. Tomorrow you stick those vecting wires in your pretty head and

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risk turning your brains into turnip puree. Tomorrow you knee AllMine in the nuts so hard they'll be singing soprano for years to come."

That last brought the ghost of a smile to her lips. "You keep saying tomorrow, Eddie. What about tonight?"

I banished the ghost with a kiss. "Tonight you're *mine*." I kissed one eye. "Because I may be crazy, but I'm not stupid." Her other eye, no longer filling with tears. "Because you're brave and beautiful." Her lips, soft sweet and open now. "Because after you pull this off you'll probably have such a swelled head that even someone as rich and famous as me won't be good enough for you."

She gave a cry of mock outrage and pushed me over backwards on the bunk, pinning my body with hers. Then she began getting even.

Those sultry southerlies blew that night, breeze and gust. We rode them together, laughing at how high we climbed.

There was forgetfulness in that night and I needed it desperately.

Core told everybody that I was risking everything, and I suppose I was. Core was talking about all I owned in Jupiter orbit.

But you don't build a city—a Kingdom—and then spend most of your time tending bar if *things* are what you value most. The risk of my things seemed unreal and unimportant. Like everyone else, I was taking a very real risk with my life as well, but I don't remember once thinking about dying.

Only one risk terrified me, and that was the risk of something I did not own: Gemyn's life.

Voices.

Glimpses.

Subjective time turned unreliable. Hours that ripped through the fingers like fractions of a second. Single moments which stretched into aching lifetimes.

I can only describe those intense, chaotic hours in voices and glimpses. Too much was happening, too many people yelling, too many flashing lights, signals, comp-voices, orders, warning buzzers, reports, flickering screens, the heavy smell of sweat in the air and its taste on the lips, disaster looming; all that and more, then more again in a sense-staggering, hours-long assault.

Voices and glimpses.

This is how I remember it.

Rabo was hunched over the console next to mine. His voice was tense, he was right on the verge of reverting to LunaRussian. "AllMine autofac ignition in *three* . . . two . . . one . . . now!" On the main screen above our heads, the afac's huge engines lit with blue fire. The autofac, larger than an earthly high-rise mated with a footbal stadium and carrying some 500 contractees and company people, began its long acceleration out and up from its orbit off Callisto ahead of us and below.

That was the signal for too many things to begin happening at once, for the real beginning of our all-or-nothing gambit.

"Eddie's afac and CoatTail linked and green, ignition . . . now!" cried one tech. "Kingdom spindown to low-

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g complete!" shouted another. "*Promised Land 1*, on track, boarding complete!" Then Red's voice rang out. His warning was piped through the whole Kingdom to reach everyone on board, all suited up and strapped down if Luz had done her job. The habcylinder was barely turning to cut down on precession, the outer levels down to .2-g.

"Tugs green, on signal, Kingdom ignition in *five*. Hang on, friends and neighbors." My palms were sweating; I kept thinking that Red sounded so goddamned calm. . . .

"Two!" Red continued. "one, here it comes, now!" Vibration rushed up through the deckplates as the Kingdom awoke, straining like a fat old man trying to heave himself out of a deep chair. "All tugs at full burn!"

Kent put in, "Kingdom thrust climbing! We're moving, folks, we're *moving!*"

Tugs indeed. They were big fifty-seat buses, one two-thirds full tanker, and a dozen short-haulers; every damn thing we could lay hands on hooked up and pulling its heart out. The vibration became a deep tooth-rattling throbbing as we began to lumber outward.

A strident babble of voices reigned for the next while; it was impossible to separate one from the next. The screen before me showed a flashing tangle of red and blue lines, one color changing to the other as the Kingdom's fluidic balance system fought to keep us from wobbling. When I had a moment to spare I stole a glance at Gemyn, sitting in the command chair we'd rigged at the front of the compartment, just below the main screen.

Her face was set and expressionless as she meticulously sorted the cables in her hands, attaching some to each other, plugging others into the black and gold electronic wound in the back of her skull. Core was at her side, helping and lending moral support.

I looked away, shuddering and wishing I hadn't seen that. Trying to keep my mind blank I touched a stud that changed the screen-read over to course plots to see the mad ballet of forces we were hoping to bring together. I didn't want to let myself think about what she was doing or what she planned to do.

The Kingdom was beginning to move off obliquely in the same direction as the autofac like a big dog chasing after its master, angling out to intercept it some hours later. CoatTail was on an intercept vector, coming from behind and above. The ship AllMine had ripped but which we had retaken and renamed *Promised Land 1—PL1* for short—had already swung down toward Callisto and picked up a load of contractees out from the Europa autofac, had almost overtaken the Ganymede afac to provide a distraction, and was now soon to begin peeling outard. It was to intercept us shortly after our rendezvous with CoatTail.

"AllMine security's screaming bloody murder!" Someone behind me yelled, "They want to know why we're moving!"

"Tell 'em we on way to have weenie roast, an' if they hassle us we roast they weenies too!" Core's voice was unmistakable. So was the sharp note of hysteria in the laughter that followed.

The laughter died instantly when a woman's voice cried, "Holy shit! Se-

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curity cruiser comin' out! Burnin' for us!"

Rabo was shouting into his pinmike to warn them off. I hoped they would listen. I had little stomach for our contingency plans to cover that move. I glanced at Gemyn again. Was she ready?

Her eyes were closed, her body tense. "On the screen!" Someone cried; I looked up at the shout and saw the bright halo of the cruiser's drives as it cleared the tailbays of the orbiting autofac off Himalia, far ahead and above our present position. Suddenly a white pinpoint erupted at the afac's aft bay. The point stretched into a line. The line connected up as the unmanned, comp-remoted slinger crashed into the cruiser and the screen was suddenly awash with a deadly orange-white glare.

"Direct hit!" Rabo boomed. "Only pieces left!" He went back onchannel to the AllMine net. *"No more trying chasing us, you Nazi bastards! We playing no games!"* He was answered by an angry gabble of voices. Chuckling, he shut them off one by one.

I don't know how much longer it was before I heard the words telling us that Gemyn was moving her plan into its next phase.

"She's taking over . . . she's . . . got it! She's got CoatTail now! Correcting! ETA fifty-six minutes, twenty seconds!" One down. CoatTail was coming up from behind us, the lighter, faster complex riding its six big engines to overtake us.

"She's got *PLI* now! On comp, Renee standing by, right?"

"Right. ETA seventy-six, thirty-one, all green!" Two now run by her alone.

No program could have been developed for the incredible task ahead in the short time we had, and certainly none existed. Gemyn planned to do something that sounded impossible, acting as switchboard for and reprogramming in real time over a dozen computers linked only in her head, each one doing part of a task for which they had never been designed. Silence fell. We all knew what was coming next, and were all wondering if she could possibly do it.

It felt like years went by as we hung there, waiting, hoping, some praying. At last the report came in a hushed whisper, as if any loud sound would send our house of cards crashing down around us. "Main drivers one through four report takeover—". She now controlled the comps running the three big spacebuses and the tanker, tethered to the forward towing lugs at equal quarters. The ever-present throbbing vibration lessened as she brought them into closer synchronization.

"Secondary drivers taken over." Now she ran the rest of the junk we were using for tugs. I had to look. Sweat beaded her forehead. Her eyes were squeezed tight. Was it too much for her—for *anyone?*

"CoatTail ETA twelve, nineteen."

"*PLI* correcting again, going back to Renee."

"Afac on steady course."

"*Goddamn!*" Kent let out a whoop. "She friggin' *did* it! She's taking *PLI* back, she's got it all!"

The big screen changed, showing us the long, knobby, three-ringed spindle of the CoatTail complex gaining on us, its four big locking buttresses looking

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like talons. Docker pods paced us and waited to dart in, looking tiny and fragile compared to the braking, onrushing Station. The whole thing was in Gemyn's hands. One slight miscalculation would let CoatTail punch into us like God's fist.

It was damn scary to watch. When the report came in that we were coming on track with the accelerating afac, though still moving more slowly, and that their Pilot was demanding to talk to someone in charge I took the call, glad for the diversion. I had wondered why it was taking them so long to realize that we were attempting to follow them.

The vector diagrams on my screen dissolved into a face. I recognized the scarred cheeks, flat, punched-in nose, and thinning sandy hair of the red-faced individual on hold. Be cool, I told myself, hitting the button to make it two-way.

I made myself smile. "Top o' the morning to you, Reilly."

His eyes bulged and his face turned purple when he saw me. "King! What the fuck you pulling?"

"Calm down Reilly." I gave him my most winning smile. "Nice day for a take-off, what? Not a cloud in the sky!"

It pays to buy only the best. My comm brought me the sound of his teeth grinding together in perfect fidelity. "Jive *me*, you bastard!" he howled, "I demand to know why you're following us!"

A glance at the clock told me that CoatTail's docking—win or lose—was less than a minute away. So I just shrugged, looking hurt. "It's your own fault. You went and took off without waiting for us to kiss you goodbye."

Then I cut him off mid-curse and called up an aft view. ETA 34 seconds, read the display. I tried not to remember that the last time the Kingdom and CoatTail had been mated neither had been under power nor moving. Like leaves in a whirlwind human and comp voices swirled all around me and all I could do was hold my breath and hope Gemyn knew what she was doing, could do it and survive the effort.

"Docking crews standing by!"

"Four meters and closing! Alignment zero-four, even it up! Come on lady, even it up!"

"Seventeen seconds to mate!"

"Zero-two! Coming into it!"

"Docker crews, go! *Go!*"

"Zero-zero!"

"Six seconds!"

"We're gonna match, we're gonna—"

CoatTail nosed into its old docking locks with a rumbling boom that shook the whole Kingdom. The docking crews scrambled to clamp down the locking buttresses, then flogged their pods for every ounce of thrust as they rushed back to their bays. I counted them in my head as they reported in.

God alone knows how long it took before the last locked down. "All in!" I shouted. "Go!"

But Gemyn and the computers she kept coordinated in her mind were way ahead of me; already CoatTail's engines were creeping back up to full power, every thing else we had was at full power, and still we had not yet matched speeds with the afac we pursued. The asymmetrical aggregation of spheres and wheels that was *PL1* was flanking us then, passing us with glacial slowness. The command went out and the

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tether crews darted out to catch the wrist-thick monomo-strand cables trailing from it.

I took a deep breath, nerved myself up, and took a look at Gemyn, deeply afraid of what I would see. She was slumped in her chair as if half-dead, gasping for air, her eyes blank and staring.

"Water," she croaked, and seconds later Core was holding a cup to her lips. She barely had time for one sip before her body went rigid and her eyes rolled back in her head.

The shouting grew louder, one voice crying that the secondary drivers were dropping out cutting across the crosstalk as Gemyn brought *PLI* in ahead of us, attempting to match speeds so the tether crews could rig the three-kilometer-long tow cables between us and it, forbiddingly difficult and never before done under drive.

It seemed to take forever for the word to come that the first cable had been attached. Then the reports came in one after another while the distance closed quickly, too quickly, Gemyn not daring to increase *PLI*'s drives until all the tethers were in place. Seconds went by like bullets, then at last the final tether was in place. *PLI*'s drives glared brighter on the screen above us.

"Pulling ahead! Stand by! Tether limits in *three!—brace yourselves!* two! . . . one! . . . now!" A booming lurch shook the Kingdom from end to end as the tethers took up the terrible strain, another bone-rattling shiver came as *PLI*'s engines to full power and we began accelerating, beginning to draw closer to the vast bulk of the outward-bound autofac ahead of us, joining in the struggle to draw us within reach of the monomo cables trailing from it, those cables unreeled at our signal some time before.

"We're closing!" Red yelled, banging his fist on top of his console, "ETA Four and eleven! Here we go!"

Gemyn's body was as tautly stretched as those monomo cables chaining us to *PLI* while she strained to juggle the Kingdom/CoatTail complex, our makeshift tugs, and *PLI* as one, and to bring us within reach of those six-kilometer-long lifelines we had rigged on the autofac fleeing before us. Sweat ran down her face faster than Core could wipe it away. Her face was waxen, her jaw clamped tight, her breath whistling through her clenched teeth. My blood chilled watching her. I didn't see how anyone could survive such extreme exertion, I had to look away, sick with fear.

"One forty-one and closing!" We're—*oh Sweet Jesus, they're firing their directionals! Trying to sheer away!*" Pandemonium erupted, comp voices inhumanly calm, human voices shrilled with desperation. "Shit! ETA clock's static! We've stopped gaining!"

"Off three-five and rising!"

"They can't change their trajectory like that! They can't!"

But they had. The worst part was that there was nothing we could do. The whole success or failure of our desperate gambit depended on Gemyn like someone hanging over an abyss by a single fingertip. The whole crushing weight rested squarely on one vulnerable, overloaded human mind trying to juggle flying mountains, a *human* mind unable to forget that one slip would end the

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lives of over two thousand men, women, and children. A mind stretched past the breaking point in its life-or-death race through the cybernetic labyrinth it held together by will alone.

A thrumming shudder shook the Kingdom. "CoatTail's steering engines up two, into Red Zone!"

"Main drivers one and three into red!"

"*PLI* correcting! *We're* correcting!"

Gemyn's eyes darted frantically under her closed lids. Her breathing was a raw, shallow gasping. The cords in her neck were like cables, every muscle in her body stood out in sharp relief. Core covered one of her straining hands with her big rough hand. Gemyn's hand closed around Core's like a vise. Even over the clamor, from where I was sitting I could clearly hear the sickening sound of the bones in Core's hand being crushed. I saw the look of fear and dismay on Core face, not brought there by the pain of her mangled hand, but from the sight of the trickle of blood making its way down from Gemyn's flared nostrils, moving faster as it gathered sweat and thinned, running down over the thin white line of her compressed lips.

"Eighty-seven seconds!" It was distant and unimportant, sound without meaning.

"We're gaining again!"

"We're still off! We ain't gonna make it!"

Gemyn's blood was starkly red against the carved bone of her face. She was bleeding for me, for us all, bravely frying her brain in what must have been incredible agony for people she hardly knew. And there *I* sat, not by her side where I belonged, because the sight of

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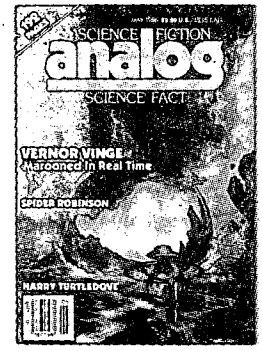

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a few wires upset me, beause I couldn't deal with the risk she was taking and the way she was taking it. I hated myself for my cowardice in that moment, standing by instead of standing by her.

I don't remember leaving my seat. They tell me I was crying. I do remember being nearly thrown to the deck as the Kingdom lurched and boomed once, then again as she fought desperately to bend the titanic forces she juggled to her will.

I reached her just as her head began to lash from side to side and someone cried, "Twenty-four seconds! Damn! So close!" Blood was pouring from her nose by then, running down the pain-stretched ivory mask of her face and thrown everywhere as her head whipped wildy. The Kingdom shuddered, the deck shaking like jelly. Someone shouted, "Leak in section nineteen!"

I caught her face in my hands, the bottom dropping out of my stomach when I felt how cold and clammy her skin was. Her head bucked and flinched with a mad strength.

"Eddie's here, Gem," I told her, hoping she could hear me, hoping it would make a difference. I wanted to beg her to stop, to give up before she killed herself. But holding her face in my hands I had one hope-smothering instant in which to realize that if what she was doing did not kill her, then failing and being forced to suffer everyone's anguish and despair surely would. That would overwhelm her so badly that the string would snap and the kite would blow into endless night.

I know I was crying then. "Hold on, love," I begged her, "Hold on tight for me! I'm right beside you! I know you can—"

"Leak in section sixteen!"

"Eleven seconds to tethers!"

"We're still off! We—" The worst lurch yet occured to the sound of screaming steel as the Kingdom was yanked and twisted by forces it was never designed to withstand. She was still trying.

"Leak in sections five and nine!"

"Section twenty-one!"

"Seven seconds! We might, if she—"

"Tether crews, go! *Go! GO!*"

I tried to hold her, she was jerking and spasming as if she were being electrocuted, and for all I knew, she was. The Kingdom was wrenched again, staggering me. I held on grimly, begging her to hold on just a little while longer, just a few seconds more.

"Tether crews two, five, and nine linked!"

"Move it you assholes, *move!*"

"Two leaks in CoatTail, one engine overheating!"

"Almost there," I crooned, "Stay with me, stay with me—" She was making a thin keening sound, her face so blood-slick I could hardly hold her head still. Core held her shoulder. The seconds passed like eons.

"One, four, seven, and eight linked!"

"Six and three linked! We gottem *all!*"

"Almost over love, hang on, I've got you, I won't leave you—"

"Tether limits coming up! Hang on!"

"*PL1* going to local! Got it Renee?"

"Got it!"

"Coming up! Co—"

There was a horrible twisting lurch that rattled the people in the compart-

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ment like dice in a cup. Steel groaned in torment. Someone cried, "Leak in forty-six! Bad one!"

"CoatTail back to local, engines off!"

"Kingdom engines off! Comps coming back, tow program coming up . . . *running!* We got our ride! *We fucking made it!*"

Gemyn went slack in my arms with a terrifying suddeness. Her head lolled to the side and her mouth fell open, blood gushing out over her teeth and lower lip. I couldn't even tell if she was breathing. Core—working one-handed—and I unhooked her as fast as we dared, then I swept her up into my arms while I cried, cursed, and screamed to make myself heard over the laughter and shouting. She lay in my arms limp as death as I started toward the door at the back of the compartment. Someone tried to take her from me. I swung my elbow and broke his nose.

Then there were bodies and hands all around me, Rabo and Core breaking a path, leading me and my precious burden out the doorway, down the tubeway, along the endless corridor and into the infirmary.

The medics had to work around me. They would have had to saw my arm off at the wrist to make me let go of her hand.

Before too many hours had passed I had come up with my way of dealing with the deep coma she was in: I stayed in her room, close by her side, and spent every waking moment drunk. After that the hours passed on a bleary haze.

There's nothing more we can do. It's up to her now. I'm sorry, but it doesn't look good. Drinking helped keep those words back in the haze where they couldn't hurt me, couldn't hurt her.

People came and told me things. *Nine people killed when section forty-six opened to vacuum.* That was terrible, but a few more drinks made it bearable. *AllMine promising dire retribution.* Isn't that nice. I'll drink to it. *Rabo, Core, and Glen are camped in the hall outside.* Tell them the time passes easier if you drink. *Decisions need to be made.* Core and Rabo, Kent, Red, and Luz can handle everything. *You're not eating.* No, I'm drinking, and where's that vecting vodka I told you to bring?

You're not helping her by acting this way.

Then I would fly into a drunken rage, screaming at them to get out, that they didn't know what they were talking about.

The equation was simple, the answer obvious. Drunk, with my eyes closed, I could see a kite above me in the sky: just a tiny white mote far far out of reach, attached to me only by a string so long, so achingly thin and tenuous, so hopelessly breakable.

That string was my belief that she would pull through, that she would be all right, that she would come back to me. Sober, I doubted. Sober that belief slipped through my fingers and without that belief life hardly seemed worth living. If she could feel what I felt, and I couldn't hope or believe, then how could she? Despair would snap the string and she would be gone.

So I drank and dreamed of the moment she would waken, held her hand and told her all the things we would do together when she came around. I drank

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and tended my little flickering beacon of hope and love.

I wanted that hope and love to be the wind that blew her back to me.

I came awake with a gobbling scream, certain the tug I'd felt was that imaginary string being torn from my hand. I had passed out lying beside her, her limp hand in mine.

But now her hand held mine tightly, had pulled it to her breast. "You smell like a distillery," she whispered hoarsely.

I could only stare at her, my mouth working soundlessly.

"That was worse than what RecNet put me through when I was Adjusted, turned into—" She paused, shook her head weakly. I had no idea what she was talking about, unless it had something to do with how she had become so hypersensitive. I could only marvel that she was awake, that she *was* talking.

Her face was thin and wasted. Tubes ran from her nose. But she was *beautiful*, her gray eyes bright and laughing at me out of sunken, smudged sockets.

She licked her lips, smiling at me. "You're going to have to clean up your act if you expect me to stick around, Eddie."

I nodded dumbly, too filled with too many things to do more.

"We've only just begun—"

I nodded again, finally daring to touch her cheek, hoping she did not shatter or dissolve like a dream. "Gemyn, I—"

"So much to do—" her voice was fading. "But I'm so sleepy—"

Her eyes closed and she slept. Her hand was warm and clung to mine, her pulse beating strong and certain. I kissed her hand, then her cheek. After a while I left her sleeping and stumbled to the door. It opened on the brightly-lit corridor.

Core and Rabo sat on the floor across from the door, their son Glen wrapped in a blanket and sleeping between them.

"Good mornin'," Core said quietly, watching my face closely. Rabo took her hand, his face solemn.

I felt a foolish grin coming on, and though it made my head pound, it grew wider and wider.

"It is," I told them, "one of the best."

Everybody has heard one version or other of this part of the story and the rest of it, so you know that in a way it *was* a kind of morning for it was only the beginning of our long journey. There were both happy and desperate times ahead. As I said at the outset, it's a long story, but one more than worth telling.

Looking back, I see that there are so many things I've left out. Not the least of these is the story of those contractees who had been confined to the outward-bound autofac shortly before Gemyn's arrival because AllMine never took chances on contractee desertion. We had no way to reach them or take them with us, and had to be content that if all went well we would meet them there. A few of them knew what we were doing, and bravely kept our secret. That story should be told, and so many others.

But I will stop now and leave all that for some other time. There is a nice symmetry in ending with a beginning. It leaves you with promise. It leaves you with hope. ■

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G. Harry Stine

THE DREAM IS DOWN

"Down" and "out" are not at all the same thing.

The months since the Space Shuttle *Challenger* Flight 51–L disaster have enabled us to gain some perspective on what really happened and what the consequences are most likely to be.

The American people were profoundly upset by the loss of the *Challenger*. At first, it was because seven people lost their lives doing a very risky thing that seemed to have become commonplace. ("Ho-hum, another shuttle launch!") But, as the months since the disaster passed, the emphasis shifted away from the *Challenger* Seven. Of course, they were heroes, but the initial grief was leavened by time.

Or were we really mourning something else instead?

Shortly before this was written, four people lost their lives when a bomb went off under a passenger seat in a TWA Boeing 727 over Greece and an American soldier was killed in a West Berlin disco by a terrorist bomb. Twenty-five people were recently killed in a mid-air collision in the Grand Canyon. In 1985 alone, more than a thousand people were killed in aviation accidents. In the same year, more than 50,000 people died on American roads and highways. In fact, it's now a sick joke in Washington that when seven people are killed, Congress convenes a fact-finding committee, but when 70,000 people die from smoking cigarettes, Congress votes a tobacco subsidy.

It has taken several months to discover what really upset most Americans about the *Challenger* disaster:

We lost our dream!

In an orange and white fireball in the clear Florida morning sky, each of us felt we had lost the chance of going into space ourselves, of following the fron-

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tier spirit into new lands, of daring the universe with technology and winning.

The American people also learned that the *one* government agency, NASA, that made us feel good about ourselves and that we felt we could really trust, turned out to be just another bureaucracy run by the Peter Principle. This came as no surprise to many of us who spent a lot of time and wrote a lot of things trying to convince people that there were problems which NASA *should* have been solving but wasn't.

But we live in a crisis-motivated civilization. Nothing much ever happens in business, commerce, industry, finance, insurance, government, politics, or even science and technology until someone convinces everyone else through the various information media that there is a clear and present danger. I wrote some magazine columns and articles warning "if this goes on," and my fictional counterpart wrote a novel called *Shuttle Down*. For a few days after the disaster, I enjoyed a brief flurry of media attention because I was the Cassandra who'd forecast such a thing. But then the whole *Challenger* matter was split into two camps of people, each pursuing different ends, just as I'd forecast in a 1983 magazine column.

The first of these went looking for blame by turning over rocks where they found things that surprised them, and digging their way through mountains of bureaucratic paperwork where the things they found confused them. They were countered by a group consisting of some NASA and aerospace industry officials who scurried around madly trying to cover their mistakes and bad decisions, compounding confusion with commotion (an old bureaucratic trick), covering their own anatomies, protecting friends, buddies, and customers and stalling for time in the hope that it would all eventually blow over like a rapidly-forming but quickly dissipating summer thunderstorm. As of this writing, both groups are still at it and probably will be for months to come.

There's talk of a "safety oversight committee" to review each space shuttle mission before it's launched. But isn't that exactly what NASA had when the *Challenger* blew up?

Safety committees don't work in the crunch. One person finally has to decide go-no-go and accept the responsibility which cannot and must not be spread among a committee, where no single person is accountable if something goes wrong. I speak from experience. I cut my teeth on rocket safety more than 30 years ago. After a lot of training, I became the lone individual who stood with my finger on the button when Navy rockets and guided missiles were launched at White Sands. I was Chairman of the Inter-Range Safety Group in 1956–1957 and helped codify a standard set of safety criteria that would be used on all Department of Defense rocket and guided missile ranges. Afterwards, I wrote the safety rules that allowed people to fly more than 250 million rockets. Sure, they were little model rockets, but they're operated under the same basic safety rules we learned the hard way at White Sands. And I've served as Safety Officer for

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years on model rocket ranges where irate parents took the place of angry scientists.

There have been some gut-wrenching occurrences. One night I told a well known and politically powerful upper-air scientist with equipment riding in the nose of a little Aerobee rocketsonde that the winds aloft were too strong and thunderstorms were moving through the area. All upper winds data indicated that the unguided Aerobee would impact off the range. Therefore, I told him he should cancel for weather reasons. He said he was Project Scientist, he needed the data, the delay would result in a budget over-run, and therefore he was going to launch. I replied that I would push the destruct button the instant the rocket cleared the launch tower. He launched. I pushed the button. The commanding officer called me into his office the next morning and asked me what happened; I told him. Nothing more was said because the Word of the Safety Officer is as the Word of God. There is no tribunal that can over-rule or second-guess a Safety Officer. There can be no retribution against the Safety Officer. He calls the shots. If he calls too many unsafe ones, the range commander diplomatically transfers him to some other position.

That decades-old policy works very well. People can be easily trained to use it and be unafraid of invoking it when the need arises. I saw it work amazingly well at Lakehurst Naval Air Station in 1980 during a World Championships for Space Models when it became absolutely essential for one of the American team members to launch in order to win. But the model wasn't right and the winds weren't right . . . and the Range Safety Officer, an American, refused to give launch clearance in an almost classic thirty-second stare-down, thus permitting an eastern European country to take home the gold medal. No one criticized the Safety Officer. In fact, he was commended by all present for standing his ground and doing what he was supposed to do. (He's a NASA engineer in the space shuttle program; maybe the Administrator should talk to him)

Obviously, individual Safety Officers must be persons of the highest integrity with the ability to make an instant decision if necessary and the guts to stand by that decision. Not everyone has what it takes.

A safety oversight committee cannot prevent another space shuttle accident. It can either delay the program so badly that it won't make any difference in the long run, or it will mean that nothing gets launched. Safety is something that engineers try to build into devices. Since no one will ever be able to design and build a perfectly safe device of any type (people still bang their fingers with hammers), users must be taught what the safety rules and the safe operating limits are. If the automotive industry had a government safety oversight committee riding herd on it, we'd all be walking.

So: The dream is down.

The NASA Space Transportation System (STS) or "space shuttle" is grounded.

The United States is in trouble.

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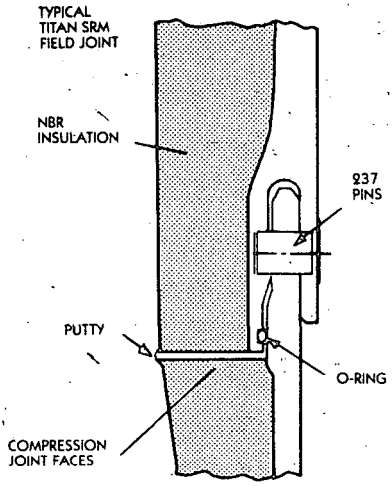

FIGURE 1: Cross-section drawing of the space shuttle SRB field joint.

So a second group of people, myself included, went looking for a way or ways to get out of the mess and move ahead.

It would be well at this point to have a brief look at what happened and why, if for no other reason than to help us learn from costly mistakes and see to it that it doesn't happen again.

The basic cause of the Mission 51–L accident was the failure of the lower joint on the right Solid Rocket Booster (SRB). No segmented solid rocket has failed that way before. Segmented solid rocket boosters 120 inches in diameter have successfully boosted more than 100 flights of the USAF Titan-IIIC medium-lift launch vehicle over the last 20 years. Those Titan-IIIC SRBs were manufactured by United Technology Corporation (UTC).

Why did the Morton-Thiokol SRB joint fail when more than 200 UTC segmented solid boosters have flown successfully?

First of all, the legs of the clevis of the UTC field joint design (see Figure 1) are reversed when compared to the Morton-Thiokol joint (see Figure 2). They point down, not up. Thus, the UTC joint will not collect water from condensation and Florida storms where the water could run down the side of the booster, collect in the joint, and then freeze, expanding the joint and possibly making it difficult for the O-rings to seal properly.

Secondly, the segments of the smaller, 10-foot diameter UTC boosters are fastened together with 237 pins and use single-piece O-rings. The Titan-IIIC lifts off with only the two boosters fir-

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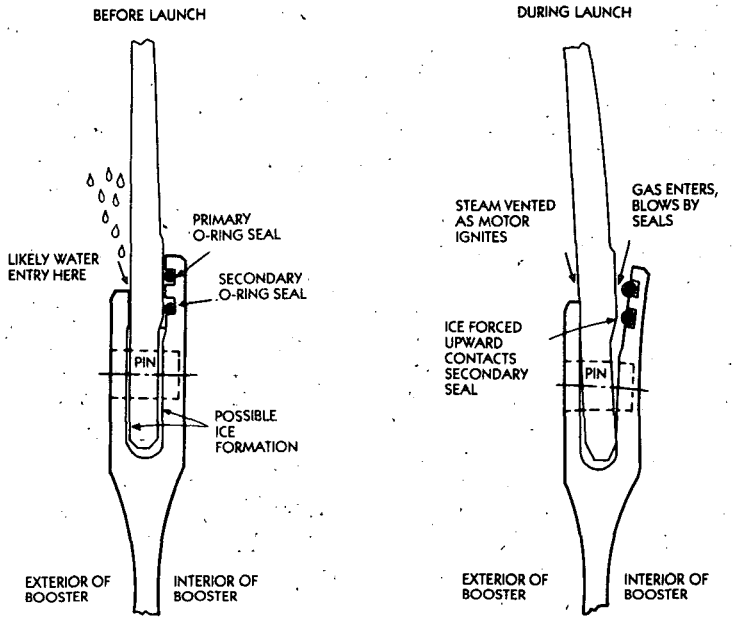

FIGURE 2: Cross-section drawing of the Titan-IIIC SRB field joint.

ing; the central core engines start in flight after booster separation. Thus, only column loads are experienced by the Titan-IIIC boosters and their joints. On the other hand, the segments of the 12-foot diameter shuttle SRBs are fastened with only 177 pins and use sectored rather than continuous O-ring seals. The ignition sequence of the space shuttle is different, too. The main engines of the Orbiter are ignited first. Since their thrust line is offset from the center line of the vehicle, the entire shuttle stack undergoes what they call a "twang"—the thrust of the main engines causes the entire stack to sway, the nose of the stack pitching down (which in the vertically stacked position is to the side on which the Orbiter isn't mounted) by two feet and springing back again. Since the stack is held to the launch pad by explosive bolts around the base of the SRBs, the lower joints of both SRBs are subjected to bending loads that were never encountered by the joints of the Titan boosters.

The engineers obviously thought they'd done the job right. And years of qualification tests were successful. However, Morton-Thiokol doesn't static-test the SRBs in the vertical position as they're used on the launch pad; the SRBs are tested in Brigham City, Utah, in the horizontal position with the entire booster supported along its length. Although there are no bending loads dur-

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ing such tests, another phenomenon occurs. The 12-foot diameter booster segments and their rubbery propellant actually deform out-of-round when put on their sides for static testing or for rail shipment from Utah to Florida. This out-of-round situation has occasionally caused some segment mating problems when the SRBs were stacked in the VAB at the Cape.

Before conducting horizontal static tests and for a few of the first shuttle flights, Thiokol had a small technician crawl into the huge center hole of the propellant charge (or had him lowered in a sling when checking the vertical stack at the Cape) to inspect the zinc-chromate insulating putty that was plastered between the booster segments; occasionally, he'd butter a little more in place here and there. (Talk about sticking your head in the lion's jaw!)

Obviously, the technical snags and glitches and design flaws can be corrected now that engineers know what they are. The SRBs should be modified with a quick-fix redesign because it's the fastest and cheapest way to go—and the shuttles must start flying again as soon as possible.

How can something like this be prevented in the future? First of all, it can't: In spite of everything we do, the universe continues to remind us that we don't yet totally understand it; that's called Murphy's Law. And poor engineering and sloppy quality control have been, are, and will be part of our lives. The best we can do is to recognize such things early in the game and lower the probability of such poor design elements creeping into structures in the future. This is something that engineering schools need to look at because good engineering means not only good scientific and technical education but also learning how to tell the managers it won't work the way they want it built and then having the guts to stand up and be counted even when the consequences are dire.

So even if the space shuttle starts flying again by mid-1987 (optimistic at best in light of the Rogers Commission report and the reluctance of NASA to take ANY risks now), the space program will never be the same again. The world changed on the morning of January 28, 1986, just as it did the evening of October 4, 1957.

Can we resurrect the dream? What do we do? What can we do?

First of all, we made the mistake of committing our entire space future on a single space transportation system. This should never be allowed to happen again. In the name of economy and budget-cutting, the space shuttle program was short on money from the start. It was run on a philosophy that required it be stretched out in time with the hope that it would cost less . . . which it never does. It was run on a stretch-out because no one was willing to stand up and say, "If we're going to do this at all, we must do it right or it'll cost us much more money in the long run . . . to say nothing of lives and lost opportunities."

The space shuttle was also a government and therefore political project. For over fifty years, the federal government

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was very good at carrying out big, long-term projects successfully, starting with the Panama Canal and various reclamation projects early in this century and culminating in the Apollo manned lunar landing program, which was probably the last big and successful federal project; the rest of the recent ones do not seem to be working as well.

The best numbers available say that the United States has invested about $20 billion in the space shuttle program. Even when the three shuttle Orbiters are flying again, only 60% of the system will be available, not 75%. Five Orbiters were really needed, and the mission models for the next five to seven years really require five ships. Much argument has ensued over this. Most NASA managers claim that four Orbiters scheduled 100% of the time are adequate.

However, no airline, truckline, or busline can possibly manage to operate with all of its vehicles scheduled 100% of the time. If it does, lots of trouble will occur when one is lost, when one breaks down and must be fixed, or when one must be pulled out of the system for routine maintenance or even up-grading (as the *Columbia* was). A stand-by must be available while the engineers, maintenance men, and purchasing experts scurry around trying to get the parts and fix the busted one. In the airline business, the cargo package expedited beyond even passenger baggage is the box that bears the big red letters "AOG" which stand for "Aircraft On Ground" and means that the package contains a critical part needed to get an airplane back in operation.

But NASA tried to operate 100%. It really needed five Orbiters to do what it has to do in the next ten years. But it only has three, so it's operating at 60%.

A three-Orbiter fleet simply cannot do what the United States has planned to do in space. Acting NASA Administrator Graham told Congress that the Space Station cannot be built, much less serviced, with three Orbiters. Apparently, no one listened or believed. The Department of Defense has bumping rights over any other payload; its surveillance, early-warning, communications, and weather satellites must be flown because the defense of the United States depends upon these military satellites. The Strategic Defense Initiative Office (SDIO) has already booked one shuttle flight per year, and they've hung onto their priority. Scientific missions such as Galileo, Ulysses, the Hubble Space Telescope, and others have effectively been placed on indefinite hold because of the cancellation of the shuttle-boosted Centaur. And NASA has pulled the plug on all additional future commercial payloads.

So a *Challenger* replacement, tagged OV-105, should be built. It will cost between $2.5 billion and $4.0 billion and will roll out the door of the Palmdale, California factory 36 months after its construction is authorized. That will not put us back where we were on January 27, 1986, but far behind because we will have lost four years no matter what we try to do.

Do we need to build OV-106? Do we

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continue to throw good money after bad, as some people have claimed such a move would be? Suppose we lose another Orbiter? Do we hedge our bets at a cost of another $4 billion? Two factors indicate a point of diminishing returns, however.

OV-106 would come off the line 60 months after go-ahead because only one Orbiter construction bay is available at Rockwell's Palmdale plant; the other was taken over for B-1B bomber production. That means that if full authorization was given in 1986, the earliest date we could get OV-105 would be sometime in 1989 with OV-106 coming along in 1991.

However, what has happened to the existing three-Orbiter fleet in the meantime?

An Orbiter was supposed to last for 100 flights. Some experts are guessing that 50 flights is a more realistic figure, while some pessimists say that NASA will be doing well to get 25 flights out of an Orbiter. *Challenger*, the Orbiter with the most flights and therefore the most wear and tear on it, reportedly already had microcracks in the wing box spar carry-through structure. The brick-covered Orbiters are not as sturdy as they appear. As for the main engines, they were supposed to go for 50 flights between overhauls; they're being completely overhauled after each flight. Other systems, subsystems, components, and parts aren't lasting as long as anticipated, either. The post-*Challenger* investigations have revealed that the Orbiter fleet was operating only because some technicians at the Cape had become experts in cannibalization, stealing something off an Orbiter just coming into processing and putting it in a bird on the pad, hoping that either the replacement part would arrive before the cannibalized bird got to the pad or that another part could be yanked out of another incoming Orbiter.

Some simple arithmetic will show that the existing three Orbiters will be worn out by about 1995 even with a 50-flight life and OV-105 joining the fleet in 1989. Thus, just when the Orbiters are needed in order to service the Space Station they've built, they're worn out. And if they're not actually worn out, they're getting a little bit like a Boeing 707 with 90,000 hours on the airframe; you tend to get a bit twitchy about the possibility of metal fatigue, even in a robust structure, when it gets up on the high end of its design life span.

Building more $4-billion Orbiters isn't the answer. Two factors limit us there. Even if someone presented us with a dozen Orbiters free and clear, the United States couldn't afford to operate them! And another limiting factor is ground facilities for processing and launching space shuttles. Cape Canaveral has only two pads and can handle only four Orbiters at one time in various stages of processing and launch. Vandenberg Air Force Base can handle only one Orbiter at a time because the shuttle is stacked and launched from the pad, unlike the Cape where it's stacked in the VAB and trundled out to the pad.

Another hidden limit is NASA 905, the Boeing 747 carrier aircraft that NASA bought second-hand from Amer-

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ican Airlines and modified extensively to carry the Orbiters. The astronaut corps has refused to land the Orbiters at the Cape because of a host of problems and will land them only on the dry lake bed at Edwards Air Force Base. This means that NASA 905 must air-lift each Orbiter from Edwards back to the Cape or to Vandenberg. If something happens to NASA 905, it could be about two years before a replacement is made ready because that is *not* a standard Boeing 747-100 but has been highly modified to carry the Orbiters.

Okay, so we can no longer count on the space shuttle to lift the dream. We're short of space shuttle payload lift capability, and NASA isn't taking reservations for any more. In fact, some shuttle payloads aren't going to be flown when they were scheduled. Other Shuttle payloads can be transferred to expendable launch vehicles (ELVs). But what is the situation there?

NASA was told to do the job with the space shuttle. So it got rid of its ELVs and didn't buy any more.

The USAF was told to use the space shuttle and get rid of its ELVs. The Air Force dug in its heels. Actually, the Air Force people did what all good soldiers have done since time immemorial when given a stupid order: they saluted and quietly kept on doing what they knew was right in order to carry out the responsibilities they'd been assigned.

The Air Force has a new version of the Titan-IIIC, the Titan-34D. The last of the Titan-34Ds is scheduled to fly in 1988. The improved version, the Titan-34D-7, is coming along but no one knows when it will be ready. The Titan 34D can put 32,000 pounds in low-inclination Low-Earth Orbit (LEO) and about half that into polar orbit.

But in April 1986, a Titan-34D blew up a few seconds after launch at Vandenberg. The system is now grounded. No one knows when Titan-34D will begin flying again. (First they must rebuild the launch pad which was severely damaged by the explosion.)

The USAF also has the 52 Titan-II ICBMs it took out of silos around Tucson and Little Rock. The NASA version of the Titan-II was used more than 20 years ago to launch the 8,200-pound Gemini spacecraft into orbit from the Cape. The USAF intends to convert 12 Titan-II ICBMs to ELVs capable of boosting 1,600 pounds into polar orbit.

The Convair Atlas-Centaur production line has been shut down and all the Atlas-Centaur boosters are bought up. Convair is thinking about re-opening the production line if there's enough business to warrant the cost. In the meantime, there are no more Atlas-Centaurs and it will take two years or so to produce any once the line is started again.

Government-subsidized shuttle and Ariane launches prevented McDonnell-Douglas and Trans-Space Carriers from finding enough commercial customers to keep the line open to produce the old, reliable Delta. The Strategic Defense Initiative Office (SDIO) bought the last three available Delta boosters. In the meantime, there are no more Deltas and it will take two years or so to produce another one once the line is started again.

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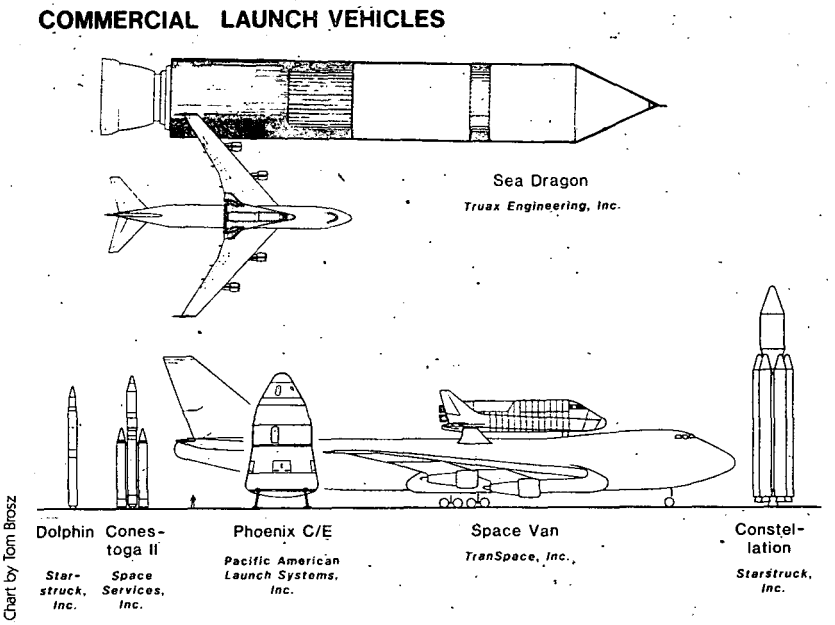

FIGURE 3: Commercial Launch vehicles. Dolphin flew in 1984 from water in Pacific Ocean; Star Struck, Inc. is reorganizing. Phoenix, Space Van, Constellation, Excaliber, and Sea Dragon are in design phase only.

But Delta is in trouble, too. One failed during launch at Cape Canaveral because of a glitch in the electrical control system.

Other countries stand to make a real windfall from this launch capability shortage. The US launch capability is going to be monopolized by defense needs, so other countries are eyeing the commercial customers who can't get early launch dates even though they've booked the shuttle or who can't get any launch committment because NASA isn't selling any more commercial launch service. And on August 15, 1986, President Reagan announced that NASA would no longer offer commercial launch services.

The European Ariane booster is booked solid through 1992. Even though the third stage of the most recent Ariane failed, this has been a recurring problem with that system and the French say they know how to make the fix. We'll see.

The People's Republic of China has three ELVs available. These are being marketed in the United States by Space Vector Corporation in Northridge, California and are made by a Chinese factory that also makes refrigerators. Westar

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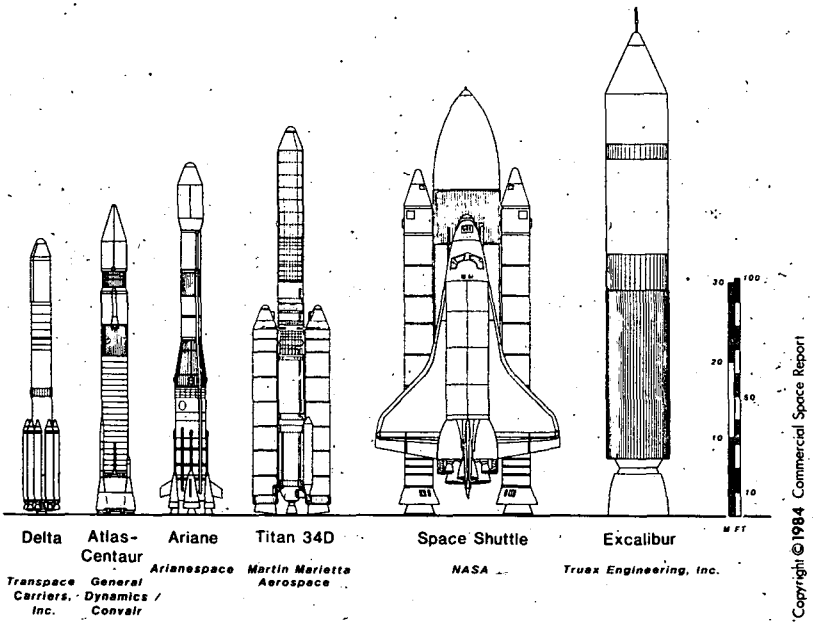

and Palapa, the two satellites that were rescued by the space Shuttle Orbiter *Discovery*, will be launched by Chinese Long March boosters. The Chinese system is so simple that they will launch anywhere; just show them where to set up the simple launch pad.

The Japanese H-1 launch vehicle is a license-built Delta but cannot be used to provide launch services to foreigners because of the licensing agreements. However, the all-Japanese H-2 is due to fly soon, and the Japanese can offer launch services with it.

The workers' paradise of state capitalism, the USSR, has already entered the ELV market with its SL-9/12/13 Proton medium-lift launch vehicle comparable to the old NASA Saturn-Ib. A dozen Protons come off the production line every year. The Soviet Union will gladly launch payloads on Protons from Tyuratam for anyone. Price: 20% less than NASA would charge. Payment in hard currency, please. And the USSR recently announced it put its Type A-2 or SLV-4 production line in mothballs last year but didn't dismantle it; this 30-year-old booster is reliable and probably pretty cheap. The USSR also has a stable of light- and medium-lift launch vehicles available. Although their new SL-X-16 medium-lift ELV will be available in 1986 and the Type -L heavy-lift ELV probably next year, it's doubtful if the Soviets will allow foreigners to pur-

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chase rides on the newest high-tech boosters.

But, gee, doesn't the United States have a space policy or even a space plan, something that will point the way out of this mess? Sorry about that. The USA has neither a space policy nor even a short-term plan, much less a long-range one. The Presidential Commission on Space tendered its official report to President Reagan detailing what the United States could do in space for the next 50 years. A beautiful document, what with Bob McCall's art work and all. But, ho-hum, it's at least the ninth such report or special study or advanced planning document produced for the federal government since I began collecting them 25 years ago; there are some additional ones that I haven't got in my library because they weren't openly available or were classified. In concert with every other similar study or report, the new one urges the United States to forge ahead to build space stations, to establish lunar bases, to build space habitats, to send manned expeditions to Mars, to mine the asteroids, and to carry out a host of other grand dreams. *Forget it!*

How are we going to get there?

And even if we managed to get there when the PCoS says it will be technically feasible for us to do so, the Soviets will certainly be waiting to welcome us and stamp our passports.

We can't do it with the space shuttle. We can't do it with ELVs. What can save us?

In his State of the Union message to Congress on February 4, 1986, President Reagan committed the nation to the development of what is known as a trans-atmospheric vehicle. He called it the "Orient Express." It has been under study for at least 50 years and stems from work done for Reichsmarshal Herman Goering of the Luftwaffe by Dr. Eugen Sänger and Dr. Irene Bredt. I'm looking at an English translation of the 1944 Sänger-Bredt Report entitled *Uber einen Raketenantrieb für Fernbomber* or "A Rocket Drive for a Long-Range Bomber." At least three generations of USAF officers have had their eyeballs on this concept. Its most recent expression, the Orient Express, is a USAF study program code-named Copper Canyon. Since President Reagan's speech, it has been labeled National Aero Space Plane (NASP) and the "Gipper Clipper." NASA, the National Science Foundation, the Presidential Science Advisor, and all the rocket types at the Pentagon detest it. But the President, Congress, and the USAF fighter jock generals love it.

NASP would take off from an airport runway and fly into space using an advanced propulsion system that starts out as a turbojet, becomes a ramjet, and ends up as a rocket. Aerojet has already unveiled a concept for this engine it calls an "aeroturboramjet."

For the cost of another space shuttle Orbiter, about $4 billion, a small-scale research test version named the X-30A could be flying by 1989-1990, we are told by a member of the President's Commission on Space. But it's nearly all new technology. A full-scale operational version capable of flying to Tokyo in 2 hours or going into orbit with shuttle-sized payload might be ready by 1999 or 2001 if there are no show-stoppers in the program.

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Based on the history of time and cost overruns of such government projects, the Gipper Clipper cannot save our space program. It's too much technology costing too much money coming too late (even though we ought to do it anyway so that we don't fall into the one-system trap again). If the Air Force had been allowed to continue the development of the Dyna-Soar 25 years ago, it might have been a different story.

What will save the day?

We need vehicles, manned and unmanned, reusable and expendable, that will lift a range of payload weights from 10,000 pounds to 1,000,000 pounds to low-Earth orbit for no more than $500 per pound by no later than 1991.

Impossible?

No. We've figured out a way to do it.

It means putting the neat high-technology future stuff on the back burner, rolling up our sleeves, and using the technology, parts, components, systems, and engineering that we have in hand, that can be bought off the shelf, that we know will work, that do not need to be tested to death, and that can be synthesized into one or more neat packages. It has to be done this way because what we desperately need is something that can be done quickly and will be cheap to operate.

Americans are pretty good at this sort of thing. At least, we used to be. People forget that the Douglas DC-1, the progenitor of the DC-3 which is still flying, went from a letter written by Jack Frye of TWA to the first flight in 10 months. The Boeing 707 went from a decision to risk more than the company's net worth, $16 million, to the first flight of the prototype, the Boeing 367-80, in 25 months. The Lockheed A-12/SR-71, which is still the world's only Mach-3 airplane, went from program approval of a design study to first flight in 31 months—and that included the development of a new jet engine and titanium aircraft construction technology. In the pre-Apollo days of NASA, the Mercury program went from inception to John Glenn's orbital flight in 41 months. Same story with Gemini: 41 months. Every single one of these examples—with the possible exception of the Lockheed A-12 project—took existing technology, put it together, did something that had never been done before, and did it in less than five years!

The Douglas DC-1 and the Boeing 707 were strictly private enterprise projects. The Lockheed A-12/SR-71 was government-funded (CIA) but was carried out by a handful of dedicated engineers under a brilliant leader and engineer, Clarence "Kelly" Johnson, in the famous Lockheed Skonk Works. The space projects were done by the early-day NASA, which simply could not (they readily admit it) do the same thing again today.

Does this tell us something?

If private enterprise is ever going to get into space, now is the time to do it!

One company is already on its way.

Society Expeditions—came to the same conclusions that I had in 1976 and that Dr. Herman Kahn and the Hudson Institute did by 1982: The next big tourist market would be space. The numbers looked good then, and they still look good today. In 1984, Society Expeditions approached NASA about chartering space shuttle flights for a 54-

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passenger tourist module they'd build to fit in the Orbiter's payload bay. The NASA Administrator turned down the proposal saying that the space shuttle was "an instrument of national policy" and couldn't possibly be considered for such a frivolous use. Although he didn't know it at the time, that was probably one of the best decisions anyone at NASA ever made!

Society Expeditions therefore contracted with Pacific American Launch Systems, Inc. of Sunnyvale, California to charter for a five-year period beginning in 1992, two Phoenix manned reusable launch vehicles, each capable of carrying 20 passengers plus a crew to LEO for 8 orbits. Each ticket costs $52,200. The first flight is planned for a liftoff at 8:00 A.M. on October 12, 1992, the 500th anniversary of Columbus' discovery of America.

Society Expeditions reportedly has over a hundred reservations and downpayments.

Can Phoenix be built? Yes. It's all existing technology. I've had the opportunity to go over all the technical aspects of the project. It contains nothing that's not existing technology—things that are routinely being done every day, and not just in the laboratory, either.

But, as of this writing, Phoenix faces a non-technical problem: Financing.

Utilizing the costing models of the Lockheed A-12 and the Concorde as a foundation, Pacific American Launch Systems believes it can build, test, and qualify two Phoenix vehicles for about $250 million. But when Pacific American walks in to talk to venture capitalists and lays out all the technical and market data, the financiers say, "We don't know very much about rockets and space. Let us check it with a couple of experts." Where do they go to get the experts? NASA and its aerospace industry contractors whose engineers firmly believe that it's impossible to build any sort of space vehicle for less than $2 to $4 billion dollars and ten years of time. After all, gentlemen, look at the space shuttle and how expensive and difficult that was!

Whether or not Phoenix is the one that will do it is immaterial. It should be abundantly apparent that if we are to save the dream at this critical moment in history, we must take a new approach to achieving it.

Unless we can figure out some way to get private enterprise involved in space transportation *now*, not ten years from now, the United States of America simply will not have any space program worthy of the name.

And if we do not make this happen, and soon, we must simply forget the dream and watch some one else do it. Or, even worse, we may have to go to Moscow to get our passports validated for space travel.

A group of us under the chairmanship of Jerry Pournelle are trying to come up with viable solutions. Working together on a computer network and in Larry Niven's home, a group of about 50 people that include aerospace engineers and managers, computer scientists and programmers, lawyers, political advisors, teachers, homemakers, association executives, and science-fiction authors has put together two important documents.

The first of these is a complete report which has been forwarded to several offices in Washington. Copies are avail-

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able from the L5 Society at 1060 E. Elm Street, Tucson AZ 85719; price is $10.

Thus, at least one group of experts in the United States says it's ridiculous to ground the entire US space program because of some faulty O-rings. The Shuttle in 1986 is safer than it was in 1985; we now know conditions under which it shouldn't be flown. As Chuck Yeager said when he resigned from the Rogers Commission, "Shucks, just don't launch when it's cold!" In view of what the Soviets are doing, this group maintains that it's vital to put a Shuttle on the pad, man it with a volunteer military crew, and FLY THAT SUCKER! It isn't going to fail the same way again.

However, the group has discovered what they think is the solution to getting a healthy, profitable private space transportation industry going. It's called the Commercial Space Incentive Act, and they've written it. A summary and the draft text can also be obtained from the L-5 Society. It's based on the Kelly Act of 1926 in which the Postmaster General was authorized to contract for air mail services with private firms; the Kelly Act gave the United States world leadership in commercial aviation. Basically, the Commercial Space Incentive Act would work like this:

The government would guarantee to purchase a million pounds of payload per year (minimum payload weight of 10,000 pounds) at $500 per pound. Anyone can step forward to claim all or part of the guarantee. BUT, they don't get paid until the government's payload is actually placed in orbit! That's the basic terms of the proposed Act; there are minor details regarding how and when and why and how much and who pays for what. Get the text of the Act. If you believe in space, support it! If it becomes reality, America may yet become a spacefaring nation in which its citizens can have the same possibility of going into space as they now have of making a trip by airplane or ocean liner.

I hope I can come back in a few years and write a happy sequel to this, informing you that the dream is still alive and that our space destiny is again in our hands.

All is not lost.
We know what to do.
We can do it.
We will do it.
We must do it. ■

• Mankind will not remain on Earth forever, but in its quest for light and space will at first timidly penetrate beyond the confines of the atmosphere, and later will conquer for itself all the space near the sun.

Konstantin E. Tsiolkovski, 1903

Submitted by G. Harry Stine

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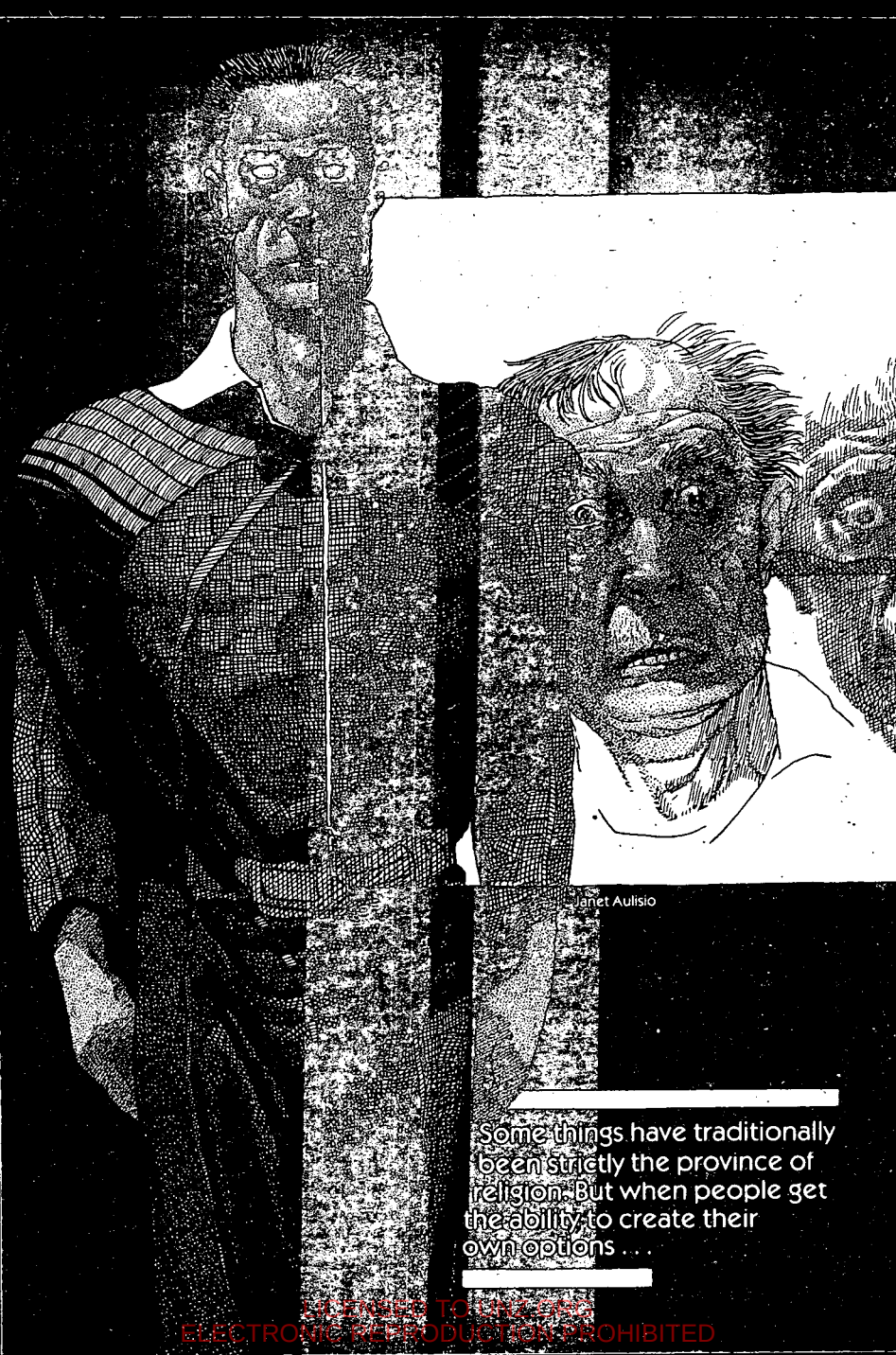
Janet Aulisio
Some things have traditionally been strictly the province of religion. But when people get the ability to create their own options . . .

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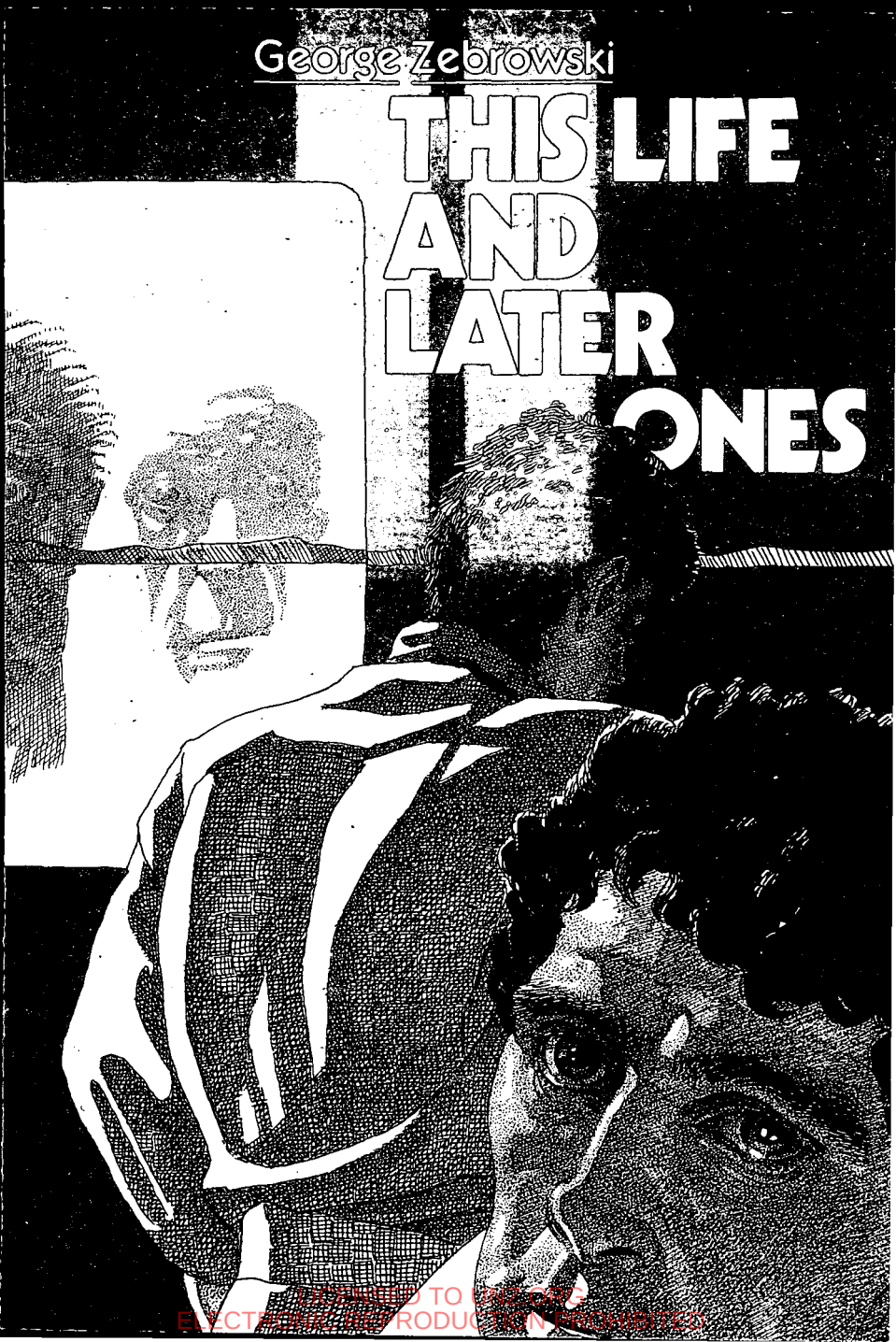
George Zebrowski

THIS LIFE AND LATER ONES



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"Some people want to achieve immortality through their works or descendants. I prefer to achieve immortality by not dying."

Woody Allen

Most people knew, by the turn of that first decade, that their lives would come to three choices: death with nothing after; death with the religious or mystical hope of a new existence; or translation into a manufactured afterlife. This last choice, which had to be acted upon well in advance of clinical death, was a service offered by AFTERLIVES UNLIMITED, a group of creative associates working out of Atlantic City since the end of the last century.

The first beyonds on the market were blank, limbo-like holding spaces where the dead waited, often crying out on the monitors to be erased, as they sat in what seemed to be gray pastures, or on flat plains and jagged mountainsides, under empty skies. Electronic souls massed in the afterworlds to decide how to live, and to test how much say they still had over their existence.

But as the programmers applied their ingenuity to the problems of world-creation, better interactive backgrounds were brought into play for the waiting departed. Things seemed to have improved somewhat by the time my father began to think of being placed, but I was worried about more than the technology.

"You disapprove, don't you son?"

I shrugged. He was past ninety. Who was I to deny him further life of any kind? "I don't know what I can say."

"Go ahead, there's not much I haven't thought myself."

"It's just that it seems to show, well, a lack of character on your part. Here you are, trembling at the edge of your grave, and you want this. If you had any convictions about life-after-death, you wouldn't hedge." I felt cruel.

He smiled and scratched his nose. "We haven't talked lately. I don't have any religious convictions left. This is the only remaining road for me, this or the dark. I suppose the technology isn't great, but I won't last long enough for the improvements to come in. Gotta go while I can still make the transfer without complications."

He went that same week. They used the actual atoms of his brain to form the transfer pattern, for metaphysical reasons of conserving identity, they said; otherwise we might consider him only a copy of himself. I went to the warehouse and saw row upon row of solid-state modules housing the electronic dead in what amounted to old age homes beyond the grave.

Visitors were allowed a week after transfer. I arrived in a bad mood, feeling guilty, expecting the worst. They ushered me into a small private room with a three-dee tank monitor on one wall.

I sat down and peered into the next world.

"Pop, are you there?" I asked, straining to see into the tank.

A shadow moved across a barren landscape, and suddenly a face gazed out at me. Its eyes seemed blind, but it was Pop.

"Pop, it's me! Can you hear?" My heart was pounding.

"Stop shouting! Do you know what you sound and look like in here? A big

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cloud with a nasty voice. Can't you do anything about that?"

"I'll try to talk lower. Is that better?"

"Not much. You still look awful."

"Is there anything you need?" I asked stupidly.

"Well, you could ask them to program some shaving utensils. Beards keep growing in here, don't ask me why."

"I'll ask, but what do the, uh, programmers say?"

"The dummies don't know how to do that very well yet, and they claim it's not in their budget! They surmise that there's some deep mental reason why the beard detail persists. Something to do with the method they used to transfer us. I'm glad your mother didn't live long enough to get in here, thank God."

"You wanted this . . ."

"I know, I know, there was no choice. But tell them that they have to make improvements!"

"What kind of improvements, Pop?" I asked, thinking that he couldn't just cut off payments from his Afterlife Trust.

"This place just isn't real enough. It's like living on a bare stage set. Worse—even that seems phony!"

I looked into his eyes, but he seemed to be looking inward, as if into a hidden mirror. He appeared defeated, resigned, despite his protests. After a moment the face turned away from me, and I saw a small shadow creep away across the dark landscape.

"Shit," I muttered as my stomach turned over and tried to fall out. My own face stared back at me from an abyss.

I got up and went in search of the administration office.

"You must realize," the local manager said, "that these facilities were pressed into service before the technology was fully developed. People forced us to open. The funding pressures were enormous—open or lose it to a competitor."

"I know, but can't you do something about provisions—about, well, landscaping, putting a bit more reality into these places?"

He shook his head and smiled, forming two dimples and a second chin. "Let me introduce you to our ace programmer. He'll explain better than I can."

We came to an open door. Inside the room, a wiry man sat at a giant screen, staring at some mathematical symbols.

"Felix, this is Mr. Canetti. He has a relative inside."

"Please." Felix motioned me to a chair as he swiveled around from the screen. "What is it you wish to know?" he asked as I sat down.

I explained my father's complaints.

"There's not much we can do right now."

"But why not?" I demanded.

He sighed. "I'm sorry, but we can't do better on the scenery right now. I know it's not much better than cut-outs pasted onto cardboard, but we're working on it." He sounded weary, but still interested in his work.

"What about provisions?"

"They don't need them. In fact, they don't need anything, not even food. All we have to do is keep their matrix sup-

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port power steady, maybe boost it once in a while."

"But they also have mental needs, aesthetic needs."

He shook his head. "We've tried sketching in details, but it's dangerous. Can't seem to put inanimate things in with any degree of accuracy, where they would be needed. There's a basic uncertainty built into dealing with these worlds, involving our ways of measuring energy inputs. I don't fully understand it myself. I'm a programmer, not a physicist."

"But you'll solve it, won't you?" The sound of hope in my voice was pathetic.

"In time we might be able to land provisions in a kind of storybook fashion. You know, program a phantom ship filled with luxuries, have it approach from the sea, dock and unload. They could come to it in safety, you see, by stages, without the danger of differing energy levels that we can't measure, and take what they need. We'd bypass the danger of erasing people or disfiguring them with arriving informational artifacts."

"How long before you can do it?" I asked impatiently.

"Depends on subscriptions, on grants, funding from the government, the number of researchers we can recruit. Not many are being trained for this kind of work. It's too new. It'll take years, Mr. Canetti. Would you rather we just erased him?"

I thought he was making a bad joke, but one look at his face convinced me he was serious and had meant no offense.

"Can you?" I asked.

"We're not even sure of that, since we've never tried it. We could probably do it. But don't mention it to—it's your father, isn't it?"

I nodded. "Why not?"

"He might demand it, and that might start something if others joined him. They might think they could die and pass on to still some other afterlife. Some of these people have gotten religion since they died."

I almost laughed, except that I felt like crying. "No one filled us in on any of these problems before I signed him up."

He looked at me sternly. "What choice did you have? Would you have let him die?"

"No," I said helplessly, feeling useless.

"There is one other choice, for now. Want to hear it?"

"Sure. Why not?"

"We could store him until the worlds are improved. But it's very expensive. Only the very wealthy have taken that option." Are you wealthy, Mr. Canetti, his eyes asked me.

"Yeah," I said, "the rich knew these worlds were bad. Who tipped them? Don't tell me, they bought the info."

"Quite right. This is a cutthroat business. But you can console yourself with the hope that it won't be more than a few years before better worlds come on the market. It has to happen."

"Only a few years?"

"Five at the outside. We'll perform miracles by then. People in the prime of life will want to live inside. It'll be better than life."

"Oh?"

His eyes lit up. "Well, as one pos-

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sibility, you'll be able to visit people inside."

"Sure—I could sail in on the phantom schooner you mentioned and land smuggled supplies on my father's dream island."

"Why not! It's not impossible, in principle." He seemed a bit hurt by my remarks. "Of course he could come out in a cyber-body and spend time with you right now, or even permanently." But I knew that cyber-bodies were ruinously expensive, available only on a custom-made basis, and that the service contracts were ridiculous. "We do have a sub-contracting arrangement for this option that we're still negotiating, if you're really interested. In your case we would need various guarantees and a financial statement."

"You sound as if you don't place much faith in the technique," I said.

He nodded. "Too many fatal malfunctions. Prosthetic embodiments can't ever be better than our environments. Consider the choice—the real world *again* or anything you can wish for!"

His company was clearly hedging its bets. "Send me some literature on the hardbodies anyway," I said, standing up to leave. It was no use trying to sound decisive; he had made me feel utterly naive.

"There's nothing I can do right now, Pop," I said at the next visit. "You'll just have to wait. Things will improve."

"You've marooned me here!"

"Don't you have any friends in there? Haven't you met anyone?" I bit my tongue, not daring to ask about what sexual opportunities existed for him now, if any.

"Yeah, *in here* is right. Even you know it's just a damn box."

Flashes of light appeared behind him as I tried to explain what I had learned—what the difficulties were in the various technologies, the costs involved, the dangers of malfunction, the lack of an effective repair and service network—but it did no good. I decided not to mention what Felix had told me about the legal problems of identity transfer. Waivers of dubious legal value were being signed all over the place to circumvent inheritance laws. There was talk of limiting the rights of hardbody recipients; periodic sanity tests might be required. No one was sure nowadays when they had been born, how long they lived, or when they were dead. I felt drained by guilt when Pop finally turned away from me.

I watched his shadow move off into what seemed to be low black hills. The sky was made of red lead. Other shadows were moving around inside the tank. I strained to see, punishing myself with the hellish sight, then got up and went home.

I suppose most people have collaborated with the enemy where death is concerned. Dying can't be helped, so accept it as best you can, rationalize it as necessary and inevitable; above all, don't poison what time you have by worrying about the coming end. In with the new and out with the old. Just imagine how terrible it would be if people you hated or had done you harm could live forever. There's solace in knowing for sure that one day they'll rot, even if you will, too.

It could have been worse. I thought

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of all those people who had invested in freezer immortality, going for the grim hope of gross preservation when electronic survival was just around the corner. Attempts were being made to transfer the mental patterns of some corpsicles, but without much success to date.

I became a brochure and prospectus hound, hungrily searching for some way to improve Pop's lot. But it all came down to one conclusion: he had gone too early; the technology was only just getting started. To make matters worse, there were few psychologists in the field of identity transfer—you died and woke up in another place, where your experience of a well-made world told you that this was no world at all. It had been made by an idiot god, or a devil attempting to mimic reality. And you couldn't even be sure that you were yourself. I was afraid of what I would learn each time I went to visit.

"How's it going, Pop? Made any more friends?"

He'd been in for six weeks. This time, he didn't speak to me at all. He wouldn't even come forward so I could see him.

"It *is* a big change," Felix, the ace programmer, explained to me. "We didn't quite understand how big until we pulled in a few psycho-biologists. It seems that the loss of the body's emotion-producing systems begins to show up. The brain tries to go on as before, out of habit and memory, but then the coldness sets in. No glands for anger, love, hate, just remembrances of what those feelings were."

"Can't you adjust inputs to make those emotions possible for them?" I asked, struggling with my own feelings.

"We're working on it. It takes endless details to create the experience of a world. Too many details for anyone to handle. Reality goes on, layer after layer of structure, both in the environments and in the human mind. Maybe it just can't be faked, ever. At least not in the way reality fakes it." He smiled.

"What about their sex lives?" I asked.

"Uh, we don't know. We don't watch to see, I mean." He sounded nervous.

"But you're telling me all this is failing!" I shouted.

He nodded. "Could be, could be."

"Then what's going to happen to all your . . . tenants?"

He shrugged. "Any number of things. We don't know yet, exactly. There's a chance we could give the subs—I mean subscribers—exactly *what* they want, by linking their minds to the modeling processors, so that they would just conjure up whatever they wish. Connect their output to their input, so to speak. The closed loop would give them the sense of omnipotence, actually." He paused. "But then again, the lack of limits might be bad for the human mind, some of the psychs are saying. God knows what hells of torment and degradation might appear in the tanks."

"What are you saying?" I shouted. "You're playing with people!"

He smiled at my mistake.

"People? Lives? They're all dead, electronic ghosts, shadows, Mr. Canetti. Don't insult me with your show of ethical indignation. We're doing the

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best we know how, and within the law."

"Yeah, sure," I said, "I know."

"Take it easy, buddy. You may need us yourself someday."

His words sent a chill down my spine.

I made a pest of myself after that, arriving three or four times a week, even if I didn't see my father. I questioned the flaccid director as often as I did Felix.

I worried about omnipotence.

What would it do to Pop to be able to have whatever he wanted? Anything was possible in the mental space of his new life. What would such power, however illusory, do to a human being? Would it only bring out the worst in human nature? It probably would.

"Don't worry," Felix said to me the following week. "It's still a long way off. He'd probably start out by calling back everything he'd lost in life, like his wife, for example, if she died in the old way. She'd appear to him just as he would want her, exacto. Good or bad—I don't know. He'd stop complaining, that's for sure."

I sat down before the tank and looked inside. The view was breathtaking this week. Green mountains, yellow sunlight, flowers—millions of flowers.

"Damn picture postcard," Pop said to me. "Beautiful little houses for us to live in, with rose bushes, and ivy on the walls."

"Well, what's wrong with that?"

"It isn't real. Looks good to you, but I can tell. Not what I remember. Too regular, too clean. There's no grime, no dust, no insects. Just another stage set."

"It's state-of-the-art, Pop."

"Look, kid, I know that. But it's not a world, no matter what they do to it. A world has a *history*. It *grew* to be the way it is. That took billions of years. There's a sense of something else, of things hidden, something you can't ever get a handle on, an unconscious part of reality, that's missing. It's not just me. Everyone here feels the same way. We can't help noticing. We talk about it, we compare. We're the only reality in this place, but there's no life to live, no gain or loss."

He still seemed emotional and argumentative. That much of his old self seemed to be surviving well enough.

"Pop, do you *care* for any of us out here, for me?" The question seemed to be the best way to confront my fears and suspicions.

He looked straight at me. "Not really—except that you guys have some power over us, so I have to talk to you. But I can't seem to feel the same way I did. How can I? You're no longer my only hope of immortality. You're your own man, and have been for some time. It's a relief, I suppose, remembering how often I got no relief from anything. We've both grown up."

"Do you want to get out of there, Pop?" I asked impatiently.

"I don't know—what do you have in mind?"

"I've been reading about the new cyber-bodies. We could put you in one. You'd be able to resume your life, walk around, do things."

"Sounds good. Probably has as many things wrong with it as this place. Maybe I should wait for when you can afford a blank clone to put me in?"

"No, Pop, I'll never be able to afford that. They take years to grow, and it's

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your biological twin you'll be invading, after you've killed its mental development. Do you want to deal with that, wondering all the time?"

"That's not a problem for me. Maybe I can get out and earn the money."

"And it's a hit-or-miss technique," I added, "making impressions in blank brains. They lose people, I'm told."

He looked straight at me. "I can't stay here, son. I'll have to try a hardbody."

It looked like him at thirty, but it was only foam over a metal frame. We got a good price on it. A twenty-year mortgage, with all my savings as a down payment, twenty per cent forfeit if he didn't like it and went back into the tank.

I read up on the aesthetics of prosthetic embodiment. Some people liked the overt Cartesian mind-body dualism. They could drive their new bodies from the head. I suppose it reminded them of their cars. Sex was also pretty straightforward.

On the day of Pop's resurrection, I went to the afterlives warehouse and watched nervously as they transmitted his identity pattern into a small solid-state unit; then they just plugged it into the head of the cyber-body.

He sat up. "Hello, son," he said coldly.

Then he got up and walked back and forth, signed a few papers, and went out the door, ignoring us all.

"No glands at all, now," Felix said, shaking his head. "But you should be glad. He'll be his own person and won't lean on you emotionally so much."

I turned to leave, feeling hopeless and defeated.

"Just one more detail, Mr. Canetti," the local manager said.

"What's that?"

"Well, you do know that we can't erase completely. There are echoes left in the tank."

My stomach jumped. "No—I don't know any such thing. What are you talking about?"

"It's not your responsibility, of course, but I thought you would like to know."

"What!" I shouted. "What is there to know?

"Please calm down. You needn't trouble yourself."

"What do you mean? That it's him? It is, isn't it?"

"Well, yes, in a purely formal sense, but—"

"And you can't erase him completely?"

"Well, we could destroy the tank physically, but there are other tenants in there to consider. You do see our difficulty?"

I glared at Felix. The coward had left it to his boss to spring the complications on me.

I'm back every week to visit. I think of him as Pop's ghost. He's very faint, but still there, and himself; more so than the hardbody that's walking around outside. He seems to need me.

"When are they going to improve this place?" he asks. "Maybe you should get me out?"

I don't know what to say. Getting him out will always be impossible, no matter how often I do it.■

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Jay Kay Klein's biolog

The path to *Analog* is long and tortuous, dependent on forbearers who, say, missed the *Titanic* by a few minutes. For George Zebrowski, it took a world war run on one side by a set of madmen. George's parents at age 14 were picked off the streets in Poland and grew up as slave laborers in Austria. Born just after WWII, he went briefly to Italy, then to England where he started school, then at six to the United States.

Like Joseph Conrad, George became fully bilingual in English and Polish; and like Conrad, he feels that exploration of the human heart and condition is the real heart of literature, sometimes with a brilliant light and sometimes steeped in darkness. Where Conrad had been a seafarer and brought this experience to his stories, George has traveled widely through the wonders of the human exploration of science.

It used to be, George says, that great scientists were also great writers; they caught the imagination and intelligence of the rest of mankind. Now it is up to the philosophers of science to reach the 99 percent of humans who are not scientifically trained, but whose destinies depend on modern technologies. He has worked both in science writing and in science fiction.

George grew up in New York City, then went to Harpur College in Binghamton, NY, where he now lives. Formally trained in philosophy, he would have pursued a career solely in this age-old discipline if it hadn't been for a deep interest in science, especially astronomy and mathematics, and a love of literature. Praised for its correct use of mathematics, "Gödel's Doom" reprinted from *Popular Computing* became the only fiction ever published in the Bertrand Russell Society's *Quarterly*.

Appearing in *Analog* this month for the first time, George most unusually arrives here not as a beginning writer but as a major novelist. He had started reading this magazine in 1960 and nearly had a story published in 1971. Then-editor John Campbell returned if for revision, but died before he could accept it. Always in need of stories to complete writing projects, George used this as the title story of *The Monadic Universe* collection. Since then, he has had contracts and obligations that directed his stories mostly to hardcover books, though nearly every science fiction magazine has printed a Zebrowski story.

George's serious literary presentations have been set in authentic science-fictional universes, resulting in such works as *The Omega Point* trilogy and the *Macrolife* mosaic of stories. Coming up as an addition to the latter is *Cave of Stars*. Back in 1976, one novel was ready for release under the title of *War Stars*, but an unexpected event required this to be published as *Ashes and Stars*. Notwithstanding, George has a real love for movies, has a fabulous collection of VCR releases, and has become an authority on cinematic SF.

With all this, George ekes out time enough to edit story collections for major publishers and edit *The Bulletin* of the Science Fiction Writers of America.

George Zebrowski

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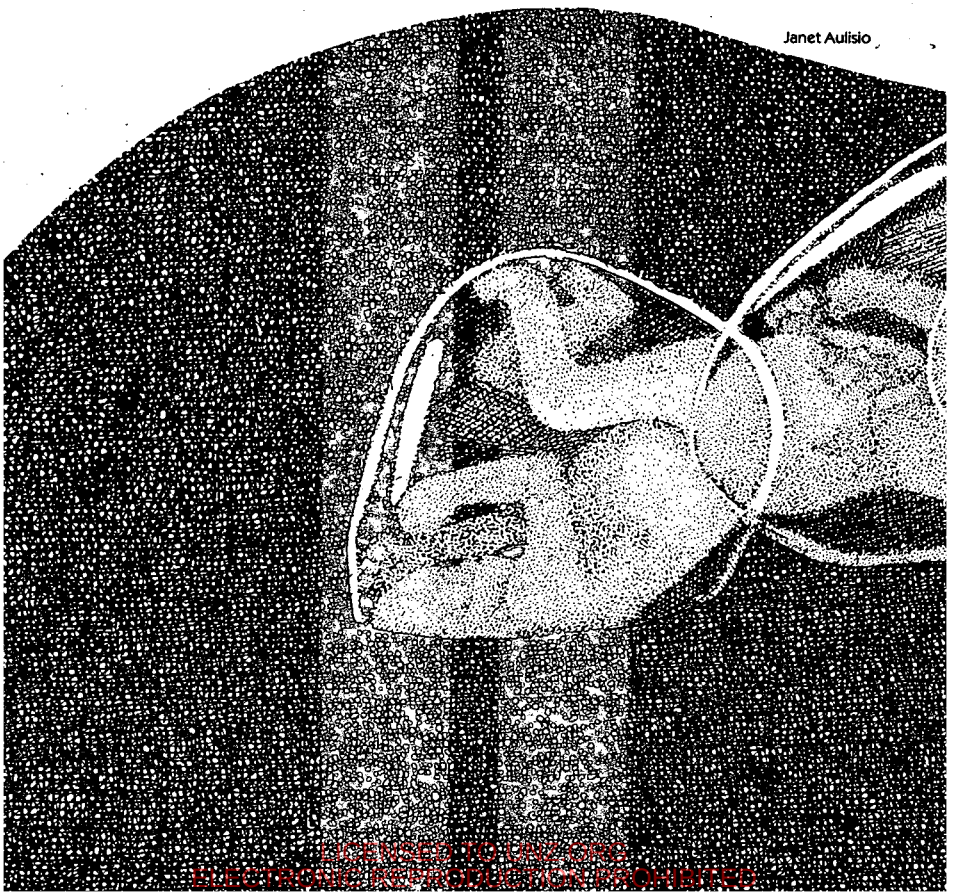
Elizabeth Moon

A DELICATE ADJUSTMENT

The best lab animal is one that's as close as possible to the species that will use the results. But the closer it is, the more complicated the ethical problems. . . .



Janet Aulisio

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When the phone rang Dale fumbled around the bedside table, finally grabbing the receiver just as it slipped off.

"Dale?" He grunted; the voice went on. "Cancel Tuesday."

"What!" He felt Paula stir beside him at that, and lowered his voice. "What do you mean, cancel! We can't, we—"

"Cancel. Trouble." The line clicked and blanked; he lay a moment, now wide awake, appalled. Paula rolled over, one elbow jarring his ribs. He wasn't sure if she was awake or not. Carefully, trying not to move anything but that arm, he slid the phone back onto the table.

"Dale?" Her voice was sleepy; he took the chance to slide back down into his place, and patted her gently.

"Wrong number," he lied. "It's OK; go back to sleep." She murmured something, rolled back onto her other side, and snored lightly. He felt himself sweating, wanted to lift the covers a moment, but he knew that would wake Paula completely. Cancel? Trouble? What could have happened? Was it a trick, to take their money and give them nothing, no embryo, no (as he thought of it) child?

They had no recourse if that was it. Not as things were, not with the laws on embryo transplant that had been passed in the late '80s. It was so unfair—he forced himself to lie still for Paula's sake, but he was furious every time he thought about it. Embryo transplants limited to federally certified facilities, requirements for psychosocial study on all infertile couples seeking transplants, a fee (to recover "taxpayer's money" supposedly), and then, on top of that, the lottery—because there weren't enough embryos to go around. He remembered the two years of testing, probing, being visited, having their friends and co-workers questioned about them—and then the fee, based on their income tax to make it fair for all income levels, and then the lottery. They had had two chances. They had lost. Three years gone.

They would have adopted a child. But decreasing fertility and increasing abortion rates had virtually wiped out the supply of children in the States. And overseas babies, once a last chance, were no longer available—not since the United Nations adopted the Stearns-Gutierrez resolution in '93. Dale mouthed the words soundlessly: "Adoption of children from underdeveloped cultures into developed cultures is a form of genocide . . ." Better to let them starve at home, apparently. That wasn't what the United Nations resolution had meant, but that's what happened; the charities still used pictures of hungry children, crippled children, to gather money every year. Dale quit giving, but he knew Paula sent money when she could.

Surely it wasn't a trick. He knew some of the women who were pregnant now—pregnant with those government embryos. That was illegal—hell, everything was illegal—but they were pregnant. And Paula's cousin had had hers, a boy. Everything fine, everything normal. He never had understood why it was illegal anyway. If you could transfer an embryo from one woman to another, from a culture plate to a woman, why not use the ones at the Institute? He'd heard the debates on TV—that research embryos weren't normal, they'd

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been tampered with—that they weren't really human—that they might carry strange diseases—that the clones were an attempt by scientists to create a master race. But he'd seen Sue's baby, a red, wrinkled baby boy who seemed perfectly normal. Where did Congress get the right to regulate reproduction anyway? It wasn't in the Constitution. He lay awake fuming, stomach churning, until the alarm went. They wouldn't get away with this, whoever they were. He and Paula had paid for an embryo—a baby—and a baby they would get.

Marilyn Lewis folded her cold fingers around the plastic cup of coffee and waited for Jennicott, the acting director, to say something. He was shuffling a pile of papers—she could see a computer printout, and a couple of graphs, and something on yellow legal paper. Ken Murry ambled into the room and took the seat beside her.

"Coffee any good?"

She shrugged. Murry grunted and settled back in his chair. She heard it groan in response, and air whistled out of the cushion. She felt, rather than saw, him lean toward her again.

"I think we've got a success in the chimaeras," he murmured. "Come by and take a look, why don't you?"

He knew what she thought of the chimaeras. "Success by whose standards?"

"Mine. Naturally. It's a three-two: classy little thing. Sixteen and going strong."

Despite her ethics, she was fascinated. "When will you sacrifice—?"

"Hush. I don't talk about that. We'll see how she grows."

"She?"

He waved one massive hand. "Historical term. She as in ships, spacecraft, and locomotives."

"Please, Dr. Murry." Jennicott looked and sounded pained. The rest of the senior staff were now around the table; neither Marilyn nor Murry had noticed. Murry waved his hand in a different gesture (Marilyn still wondered how much he had learned from his protohoms), and Jennicott flushed. "We have a matter of grave importance to discuss," he said. Marilyn bent her head to sip the coffee. They had had matters of grave importance twice a week since Tony Baker's heart attack and Jennicott's grasp of power. She was beginning to agree with Ken Murry about the gravity and importance of Jennicott's mind. After a moment's silence, Jennicott went on.

"We have unacceptable levels of wastage in two units: Dr. Lewis's, and Dr. Praed's." He cleared his throat. "At Michigan, the wastage is never higher than 4.8; I did a literature search last night, and the average cited is in that range. Under ten percent, anyway."

Marilyn took another sip of coffee. She'd expected something like this. Praed was already speaking, his blurry voice rearranging intonations to suit his native tongue.

"Cited, my dear sir. Cited wastage. You cannot believe that these other laboratories cite every cell that goes out the drain, surely." The others nodded. They all knew about wastage figures: they had to be low enough to satisfy the grant committees, and the legislative committees behind those. Some things

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simply didn't count; no one counted them, or published them, or did anything but squirt water down the pipes afterward. Jennicott looked even more pained.

"That is not the point, Dr. Praed. The point is that if you were to publish now, your published wastage would be much higher. Much. And in my opinion, the Institute is open to severe criticism from—well—several parties, Congress among them. They want to know—they would want to know, that is—where these embryos are going."

"Just a minute, Alan." Murry's drawl cut into the formalities. "What do you mean by want to know where? Have you told them of the wastage?"

"Dr. Murry—"

"Just Ken, Alan; let's not be press-conferencey at this hour of the morning. What, precisely, does Congress—or one of these other hypothetical parties—know about unpublished data from the Institute?"

"That's not for me to say. And I was not speaking of your unit—"

"Bull! We aren't cut off from each other by steel walls. Yet. If someone's blabbing to Congress—and I assume that means Cernak's committee—about our research, when we haven't even published, then they'll be blabbing about mine next. Now, dammit, answer my question." Murry, angry, dominated the table: even sitting down his size was impressive.

Jennicott seemed to freeze in place. "Dr. Murry—Ken, if you'd rather—it is certainly my responsibility to see that all the requirements for full disclosure are met. If that means preparing the committee that oversees our research for the possibility of embarrassment before that embarrassment becomes public knowledge—"

"Then you'll peach like a good 'un. Alan, you're a pimp."

"Stoolie," muttered someone across the table.

"No, pimp and stoolie. Possibility of embarrassment! Poppycock in the original sense. As if you weren't about to precipitate the embarrassment—as if the committee itself wouldn't go straight to the press." Murry sat back again, with another complaint from his chair, and rumbled to himself.

"Nonetheless," said Jennicott loudly over the scurry of whispers. "Nonetheless, I want to know why such excessive wastage has occurred, and where the embryo tissue is." A sudden total silence. Marilyn stared at the table top, and felt the eyes resting on her head. "And I want to know now. Dr. Lewis?"

She looked up the table and met Jennicott's accusing gaze. "I assume, Dr. Jennicott, that the tissue is somewhere in the city sewage system. Have you a reason to think it might be elsewhere?"

"I have no record of its being dumped."

"That's not surprising, since you have only the weekly summaries. On the—"

"No." He shook his head, interrupting. "I have the daily worksheets from your lab as well."

She raised her eyebrows, angry herself, now. "May I ask how? Or will that prejudice me in the minds of your . . . associates?"

"As acting director, I feel it my responsibility to ensure that accurate records are kept. I am not one of those who

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takes the name and lets the work slip by. Besides, after the Simmons debacle—"

"Very well. Then you should have seen the notations, for each shift, of the serial numbers of the discarded tissue."

"I did. That's how I know too many were discarded." He looked around the table. "You are not aware, perhaps, that a new monitoring system was installed in the Institute drainage this past summer. Briefly, it monitors the protein load in the effluent, and—"

Guffaws around the table. "Protein load? There goes the lab picnic!" That was Ginger Harkness. "I'll never wash dishes in the lab sink again."

"You aren't supposed to—" began Jennicott sharply. Murry interrupted.

"So now the snoops are monitoring our sewage, are they? What do they think we're doing, sneaking embryos home to sell for adoption?"

In the silence that followed, by the look on Jennicott's face, they knew that was exactly what had been thought.

"I wish it had occurred to me," said Ginger into the blankness. "Hell, that would finance a whole new electron—"

"Ginger, no!" Marilyn found herself shaking. "How horrible! That would be—"

"Profitable, though." Praed looked thoughtful. "I see. So many wanting children, and the waiting so long. Yes. And the cost to the thief very low, because of the grants, needing only to take the embryo and transport."

"You see now," said Jennicott, "how serious this is."

"But surely you don't think it's actually happened! A few missing bits of tissue—perhaps something else—" Marilyn realized that she was floundering, saw it in other eyes than Jennicott's. She stopped. When she had her breath back together, she said simply, "I don't believe it. I don't know what model you're using for protein analysis—something's wrong somewhere. But that anyone in my lab would make off with embryos—no."

"Or mine," said Praed quickly, emboldened. "It is not reasonable. How could they be transported and still be viable? The special cases are large and obvious—these cannot walk out the doors."

"You said yourself, Doctor, that the cost would be low—"

"Yes, yes, I did. The money cost, I meant, because of stealing the embryo, but what about transport?"

"You yourself move them from lab to lab."

"Yes, but Alan—" Marilyn shut her eyes a moment; she had almost ordered him to think, something Ken Murry said he couldn't do. "Alan, to transport one even down the hall takes a tank, a rolling cart, and a bunch of wires. No one could simply walk out the front door with something that size without the guard noticing."

"So I hope. I have instituted reviews of external security precautions as well. Dr. Lewis, here is the model of protein analysis of the effluent; it was approved by Dr. Baker before his untimely illness—"

"Tony approved this?"

"Dr. Baker was apprised of the need for some form of reliable accounting." Marilyn wondered if he ever talked like a human. She was beginning to doubt it. "Experts in the field have gone over

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it, but I want you to see if you can find sufficient error to explain the missing tissue." He passed across a stapled sheaf of paper. "Dr. Praed will want to see it too." Before she could ask why Praed had not been furnished his own copy, Jennicott explained. "Please don't make copies of this—it is quite confidential, as you must realize."

"Yes—all right." She was already immersed in the first paragraphs.

"You'll find it includes a plot of sampling locations; you will find that it can be quite specific about location."

Marilyn looked up. "Oh? What would happen if someone used a different drain than usual?"

"The excess would be noted in another drain, and in the overall totals."

"And just how many grams of protein do you think a few embryos provide?"

"It's all in there, Dr. Lewis. Please read it first. If you have any questions you may confer with me."

Marilyn looked back at the page angrily. Confer, indeed. Jennicott was always conferring, or apprising, or briefing—he never just talked to anyone. She put her finger on an equation as if thinking about it. The symbols seemed to writhe under her gaze.

"Dr. Lewis—" Jennicott again. Marilyn looked up. "We still have matters to discuss." He paused, as if waiting for her to apologize for inattention, but after a long moment went on. "I want you and Dr. Praed to review all personnel files, with particular attention to staff who are free to work here when you are absent. You know your staff better than I, I'm sure; you can find out who needs money, or has recently come into money, or has unsavory connections. By Friday I should think you would have progress to report." He looked at the others. "I need not tell you all how serious this situation is. Nothing must come to the attention of the press—"

"Unless it comes from you or Congress," growled Murry. Jennicott put on a pained look.

"Please, Dr. Murry. And the rest of you must be particularly careful in your own work. Other than human embryos have economic value." With that, he swept his papers into a pile and unfolded himself like a carpenter's rule. When the others did not move, he sharpened his tone. "The meeting is over. I'm sure you all have work to do." He stood stiffly by the door until they had all filed out.

Marilyn headed for the elevator, still seething. She heard the others' footsteps, but no one said anything. Ginger Harkness reached the elevator first, and thumbed the button. The light came on at 10. Marilyn watched as it went on up to 11 before starting back down.

"Embryos," murmured Ginger. "Look out, Ken, or your fancy chimaeras—or is it chimaerae?—will be popping out all over."

"Shut up, Ginger." Ken seemed more abstracted than annoyed; usually he defended his research with more vigor than that.

"What I'd like to shut up," she went on, "is Jennicott—and his fancy sewage monitors."

"Why, Ginger? Been dumping old lovers down the drain?"

Ginger laughed. "Not me. I sell them in the meat market."

"Ginger!" Despite herself, Marilyn

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couldn't let that pass. Even knowing what Ginger was like. Sometimes she went too far.

"I'm not serious, love." The elevator arrived; and the door rolled back into its slot. Ginger moved to a back corner and leaned on it, waiting to speak until Marilyn, Murry, Praed, and Dick Stovall had entered and keyed in their floors. "It's just—if they can tell from our drains that a few grams of tissue didn't pass through there—it makes me nervous. Suppose that new rationing bill goes through—are they going to monitor all the toilets to find out who's getting black-market beef?"

"Oh, surely not!" Dick Stovall looked shocked. "That's barbaric. Besides, it'd cost too much."

"Dick, barbarians don't have computers and protein sensors. If they don't do it, it'll be because it costs too much, and that's a hell of a protection for my liberty."

"Because it won't cost too much in a few years," murmured Ken Murry.

Ginger flashed him a glance. "Exactly. Besides, how do we know their information is real?"

"I don't—" The door opened on five. Dick Stovall got out. "Good luck," he said. The door closed again. Ken Murry shifted his weight and the elevator car swayed.

"Ken, don't fidget." Marilyn put her hand on the wall. The door opened on six. He put his big hand on the opening to hold the door, and looked at her.

"You really should come see my pet."

"I really should get to the lab. You know how I—"

"Yeah, but just for the sheer intellect of it. Who else can I brag to? I won't let you stay too long; we're starting another cycle today anyway."

"All right." Marilyn smiled at Praed and Ginger. "See you later. Good luck."

Walking down the hall to Ken's main lab, she was aware, as always, of how different labs could smell while still smelling like labs. In the anteroom, she scrubbed and gowned, pulling paper booties over her shoes, gloves over her hands. The room was small; she felt crowded by Ken's size. He reached over her shoulder to open the next door. This set off an alarm, and a light over the inner door. Through a thick pane of glass, Marilyn could see one of his assistants coming to let them in.

"Dr. Murry—staff meeting over?" Marilyn had not been in Ken's lab for months; she didn't know the masked face before her.

"At last. Jo, this is Dr. Lewis from upstairs. She's come to see 458."

The cheeks widened on either side of the mask. "Hi, Dr. Lewis. I'm Jo Cassidy. I took your embryology course in the summer of '92."

Marilyn had never been good at remembering old students, and summer students were a lost cause. She smiled behind her own mask. "I haven't seen you around here—"

"No, I just came this fall. And Dr. Murry keeps me busy—"

"When she's not talking a streak. Come on, Jo—Dr. Lewis has things to do. I dragged her in here with a logging chain, to see our triplet. How's it going?"

"So far, so good. Night crew had to increase the O_2. But as it's going, it'll

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be transplantable by tomorrow." Jo led them toward a tank similar to ones Marilyn had in her own lab. Marilyn glanced around. Several other gowned and masked figures worked at the tables and counters. She assumed they were doing the same sorts of things here that her own students and assistants did.

"Now—look at that." Ken tapped his finger on the front of the tank. Marilyn peered through. Instead of the standard 51mm culture plates in which her own cultures grew, Ken had designed rectangular trays to hold the medium and the cultures. Set into the side of the holding tank was the barrel of a microscope. After a dubious glance at the tiny smudges of material on the tray, Marilyn put her eye to the microscope and looked more closely.

"Double chimaeras," Ken boomed over her head, "have been known since the early '80s. Goat/sheep, that sort of thing. Curiosities, really, though the protohom line—"

"I know," said Marilyn, twirling the fine-focus. A lump of cells came sharp, wavered.

"Well, then, what I've got is a triple, here. And more than that, what I hope I've got is a selective triple."

"I thought the whole idea of a chimaera—"

"No. No, and double no. Think of a mule." He plunged into his ideas with such enthusiasm that Marilyn almost agreed that chimaeras were worth the trouble. Finally she tore herself away, and went on upstairs.

Marilyn shuffled the files on her desk. If the samplings were right, who would be doing this? She herself was a prime suspect, but she knew she hadn't. Who else? She looked at the computer printout of the drain samplings again. They were arranged in four-hour segments, roughly corresponding to the three shifts. The protein load was higher on day shift. That was natural. More work went on in the lab, more things went down the drain. She called up a week's worth of daily logs on her computer, and looked. It didn't seem to be as different as that—

An hour's fiddling with the computer, and she had a group of graphs that showed exactly where the discrepancy was. And, she was sure, Jennicott had already done this: he probably wanted to see if she would or could. From mid-second to mid-third shift, someone had reported wastage that didn't show up in the drain. If the sensors and computer were right.

She decided to test that first. Pulling on her gown, shoecovers, cap, mask, and gloves in the anteroom, she thought about it. The sensors could be wrong, though the theory seemed sound. They could be missing tissue because of sampling-error. Maybe they weren't sensitive enough. Maybe the computer had missed signals from the sensors. Or it had a glitch in its programming. Or maybe someone was feeding in false data, like the college students who had changed election results in Iowa last Presidential election. Or maybe—she frowned at the thought—maybe someone in her lab was stealing human embryos. Even selling them.

Dr. Padhari, her senior research assistant, bustled up as she entered the lab itself. "Dr. Lewis—we're behind schedule—"

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"I know, I know. Dr. Jennicott had a long talk today."

"So. He does not know the importance of time in research?"

"His time," said Marilyn shortly. "Now—what's up." Padhari plunged into a quick review of the previous night's work, and the transfers scheduled for that morning. He nodded sharply when Marilyn glanced at the clock. "You see? We can't possibly finish that by noon, and we must if we—"

"All right. Here's what we'll do. We'll transfer the ones, chill the twos—we can do them an hour or so later that way, and try that new cell-stasis technique you told me about on the threes."

"But Doctor—the loss. I am not sure what the wastage will be, but it will be high."

"That's OK. If it's high we will have plenty of embryos to examine for the reason." Marilyn knew she was about to waste thousands of dollars of tissue, but she was in a bad enough mood not to care. If they could spend whatever that fancy protein sampler cost to watch her drains for wastage, she could by God give them wastage to watch. Four hours later, she smiled grimly under her mask, as the last of the wastage swirled down the pipes. She had asked the main computer to dump current figures to her desk; by the time she got to her office, she should have the data to show whether the system worked. Padhari, who had had to weigh every discard, was puzzled but compliant.

Jeri Kinsey, arriving for the second shift, heard about the mornings's delay from Padhari. She had already seen the pile of numerical printouts on Dr. Lewis's desk, and she made the connection at once. She felt the prickle of sweat coming out on her neck, but went on with her work silently, listening to Padhari's musical voice. When he turned away, she glanced up, looking for Rickie. He shrugged at her, and she realized that he hadn't caught on.

"Kinsey." Dr. Lewis had come in; her gray eyes seemed even cooler than usual.

"Yes, doctor?"

"We have a problem."

Kinsey felt her stomach clench again, but hoped her face didn't show it. "Dr. Padhari said something about a delay—and you had to dump the threes?"

"Most of them. We tried that cell-stasis thing he'd talked of, but it didn't work. But that's not it. We have some problems with wastage the past few weeks."

"Oh?" Kinsey set down the rack of culture plates she had held, and began marking them. "What kind of problem—I know we lost that rack of twos last week, but I told you then—"

"Not that." Dr. Lewis's voice lowered. "You probably don't know that the Institute installed a protein load monitor in the drains last summer."

Kinsey felt her mind freeze, exactly like the description of a mental weapon in a science fiction story. Then it clicked back into action. "No—I didn't. Did you?" That was slightly cheeky, but then Kinsey knew her reputation. And she was willing to bet that Lewis didn't know, wouldn't have known even if there'd been a memo out on it.

"My point is that the system works—it's accurate—and we have too

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many instances of reported wastage when no protein went down the pipes."

"Oh."

"Some on your shift, and some on third. And I want to know where that tissue went."

Kinsey knew better than to argue facts. If Lewis said the system was accurate, the system was accurate. And if she had connected the missing tissue with stolen embryos, then the only thing to do was make sure her own neck stayed clear of the noose.

"I don't know." That was always a safe beginning. She kept her voice low, a little puzzled. "I flushed some of it down myself—those twos last week. But you know we don't have a way to identify who dumps each precise embryo, doctor. We never thought we needed it—" And it was safe, she hoped, to identify herself that way with the powers, with law and order and all the rest of that nonsense. She saw that Lewis took it that way, relaxed just a bit, and nodded, as if to a colleague.

"Then you're not selling our embryos on the black market?" asked Lewis.

"Holy God," said Kinsey, letting her jaw drop. Dr. Lewis smiled, then.

"I take it that means no. Good. I can't think of anything slimier—"

I can, thought Kinsey. Washing them away, just little bits of protein load for the sensors to find—but I won't argue now. Lewis was moving away, and Kinsey turned back to her work, beginning to shake with the reaction of discovery. So close—she had not known of the sensors—should have suspected. She could imagine what Roy was going to say, and Chris. And the ones who were pregnant now. At least the Harrises had theirs. And her sister. She spared a glance at her professor's back, now bent over a bench on the far side of the lab. If she could only fool Lewis a few more days: but Lewis was notoriously hard to fool. Others had tried; she remembered the Norwegian exchange scientist, who had tried to smuggle in a European reporter. But why, Kinsey wondered, carefully marking the last plate and putting the marker neatly in its place, hadn't the boss warned them? Surely *he* must have known about the protein sensors.

At break, she and Rickie headed for the basement snack bar as usual.

"What's got the doc all upset?" asked Rickie. Wide blue eyes stared at her; Kinsey didn't trust that wide-eyed look for a moment.

"She didn't tell you?"

"Not her. Asked me about how many dumps I'd made this week—I can't remember. I put it on the sheet, just like you said, Kinsey."

"Good. Sounds like the paperpushers in Admin are fussed about something. She wants all the records initialed, and that kind of thing." Rickie swore his usual stale oaths, and tossed his curly hair back.

"Does she think we're goofing off? Me with my thesis coming up, and—"

"I don't think so." Kinsey fed coins into the sandwich machine and punched for her selection. The machine groaned and hummed, finally clicking the door release. She pulled out a meagre stale-looking ham on rye and turned to the microwave. "I think," she went on, "that they jumped on her, and she's just passing it on."

"Yeah, but what about?" Suddenly

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he leaned his pointed chin on her shoulder and breathed into her ear. "Not about—you know—is it?"

"What?" Kinsey had no need to feign annoyance. "You breathe in my ear again, and I'll clout you. I don't know what about, Rickie. As far as I'm concerned, I've kept my records straight, and I assume you've kept your records straight, and this is just that idiot in Admin making sure we know he's in charge." Rickie stared at her, his mouth loose for a moment. He looked around at the barren little room, scarred from years of neglect, and started to speak, but Kinsey held up her hand. "And if your records aren't clear, Rickie, don't tell me. I don't even want to know. I've told you often enough—"

"Dammit, Kinsey—" His eyes had widened farther, as if he'd caught her intent; she shook her head, scowling.

"Listen, Rickie," she said, biting off each word. "As far as I know, the boss has her hair up about something—I think Admin—and there's no reason. No reason at all. My hands are clean, and your hands are clean—and if they aren't, you can damn well confess to her. I'm not a grant holder, and I don't want to be."

"OK." He had his own choice now, an orange and the same kind of canned pudding he ate every night. Kinsey shuddered at the thought, but he ate it steadily. "I just asked, is all. Usually the doc is a sweetie, but—"

"Lewis?" Even after the months of working with Rickie, he could startle her, and calling Lewis a sweetie certainly qualified.

"Sure. Great little lady. Now, don't get yourself steamed, Kinsey: I know she's a great scientist, and all that. That's why I'm here, after all; that's why I took her courses. But she's a sweetie, too. Nice face, and figure, and I'll bet she—"

"Is kind to dumb animals," said Kinsey, to stop that in its tracks. "Like first year graduate students, especially male ones." As she had hoped, Rickie turned bright red and shut up, finishing his horrible little meal quickly. When he was gone, she bought herself a carton of milk and sat down again to think. Rickie could make trouble—real trouble—but his neck was even farther toward the noose than her own, and if he wasn't smart enough to see it, she wouldn't worry about him. At least they had planned no transfers for that night—none in fact for a week—and maybe that one could be canceled. The real worry was who knew what, at what level. If Admin had started bugging Lewis, then someone in Admin suspected. Who? Kinsey thought it over. In the five years she'd worked in Lewis's lab, she had met most of Admin at one time or another. She had better, she decided, find the boss as soon as possible before the leaks let too much out.

Marilyn Lewis took a short nap near the middle of second shift; she was determined to confront her third shift crew the same night, before the second shift could warn them. In her uneasy sleep, dreams of research and old vacations warred for dominance: she found herself climbing a challenging pitch of crumbly granite with a chimaera and two embryos on her rope. Dr. Padhari and Kinsey—unlikely partners at best—were singing a German song she'd heard in Switzerland, while swinging wildly,

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suspended from a peculiar apparatus of steel rods.

She woke with a snort when her phone buzzed, and shook her head as she stumbled to the desk. Line four—the internal line she and Ken used most often. She picked up the receiver, ready to growl, but it wasn't Ken.

"Marilyn? Ginger. Listen, I need to have a chat with you. Can you spare a few minutes?"

"What about—I'm trying to do that stuff for Jennicott."

"Important. Come on down to my lab, will you?"

"Dammit, Ginger—" She cut that off short, and took a deep breath. Something in Ginger's voice came through, and suddenly she was wide awake. "Are you OK? Are you alone?" She wasn't even sure why she'd asked that.

"In a manner of speaking. Bring a notebook, Marilyn." And the line went dead in her ear. Bring a notebook. What did that mean? Marilyn hunted around in the pile of computer printouts for her favorite red notebook and a pen. She had two hours before anyone from third shift showed up. With a yawn, she pulled on her gown and mask, and stuck her head in the lab to tell Kinsey where she was going.

To her surprise, Kinsey was alone in the lab, and responded to Marilyn's questions without at first seeming to understand their importance.

"Rickie? He said he had a. gut bug—it's no wonder, the way he eats. Honestly, Dr. Lewis, even when I was a freshman I didn't try to live on vending machine fruit and pudding."

"Yes, but when did he leave?"

Kinsey turned to look at the lab clock. "I didn't know it was this late—it's taken longer than I thought to do these transfers. I'm not sure. We'd come back from break, and I was—let me think—probably about a quarter of the way through."

"Hmmm. Well, I'm going down to Dr. Harkness's lab for a bit. If anyone comes in from third shift, please don't tell them about the missing tissue—I want to ask them myself."

"I understand, Dr. Lewis. I doubt any of them will be here for another couple of hours. Stacy comes in early, sometimes, but not this early."

"I didn't expect anyone—just if. I doubt I'll be gone long."

Marilyn glanced in the offices she passed on the way to the elevator. Dark, empty, most of them locked: the secretarial and statistical staff for Embryology Division. A bank of pay phones along one side of the hall; two water coolers, one low enough for wheelchair occupants. The hall branched: elevators to the right, halfway down another hall. Ahead was a short hall ending in double lab doors, with "HUMAN CELL SYSTEMS RESEARCH TEAM: K.I. PRAED, PRINCIPAL INVESTIGATOR" on the plaque. Through the frosted glass panel she could see light, but no details.

She went on to the elevators; one was only a floor below, and came up at once. In the night silence, the groaning engine and cables were loud; the elevator itself smelled of cleaning solution. Marilyn thumbed the control, then leaned against the wall as the floor sagged under her. When the elevator door slid open, Ginger was waiting, leaning on the wall, with her lower lip stuck out.

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"You're missing a research assistant," she said bluntly.

"Rickie?" asked Marilyn, with a sensation of sudden doom.

"Male, blue-eyed, dark-haired, young. Nametag says R. J. Dunkett, Lab 813-A, Human Embryo Tissue, Class-J, Dr. M. Lewis, supervisor." Ginger's usually laughing eyes were cold as gray stone.

"Rickie." Marilyn took a deep breath. "What happened? Is he hurt?"

"You could say that." Ginger moved, and Marilyn followed automatically. But Ginger merely shifted a few feet to one side, and gestured at one of the other elevators, now held in place by a door locked to open. Inside, sprawled against the far corner, Rickie lay in a stinking heap, a pool of vomit drying around him. Marilyn gagged. Behind her Ginger's voice went on; Marilyn felt each word like a hailstone striking cold and hard.

"That's what I found when I called the elevator to go home. He was already dead, but still warm. So I called you—it took you while to answer, Marilyn—"

"I was asleep." She had never seen anyone dead like that; never seen anyone dead, close-up, but that one cadaver in gross anatomy, that made her decide to go into research instead of clinical.

"In your office?" Ginger's disbelief woke her anger; she welcomed that warmth after the cold shock.

"Yes, in my office. Dammit, Ginger, what are you saying? D'you think I killed him, or what? You know what Jennicott threw at me—I've been working all day to find out if that damned sensor system works—and it does. And then I tackled my second shift staff, and was waiting for my third shift to come in, and took a nap."

"You said you were working—"

"I had been, and then I slept, and I didn't want to come down here for a friendly chat, if that's all you had in mind." Marilyn hated herself for the shaking in her voice. Ginger's eyes had warmed a fraction, but not into trust.

"I notice you assume he's been killed."

"I—damn, I did. I don't know. It's unlikely—unless—"

"Unless you are having embryos stolen, and he's part of it—or found out. What do you know about him?"

"Look, Ginger, shouldn't we call Security?"

"We will. But I want to know a few things first. Are you selling embryos? Was he selling embryos? And am I likely to be killed for finding him?"

Marilyn took a long shaky breath. "No, I'm not selling embryos—but that protein sensor works—I tested it today myself—and I do have recorded wastage that never showed up. So either someone is selling embryos, or stealing them without selling them, or flushing them down the staff toilets for some reason. I don't know if Rickie was involved. He's only been here one semester. Kinsey knows him better than I do."

Ginger scowled. "If I thought you were—but I don't. You don't think that way, that I can see. Never had to—"

"Ginger—" Marilyn thought of the little she knew of Ginger's background: an inner-city welfare childhood, a chance meeting with a friend of her mother's probation officer, who had gotten her into a summer science program, schol-

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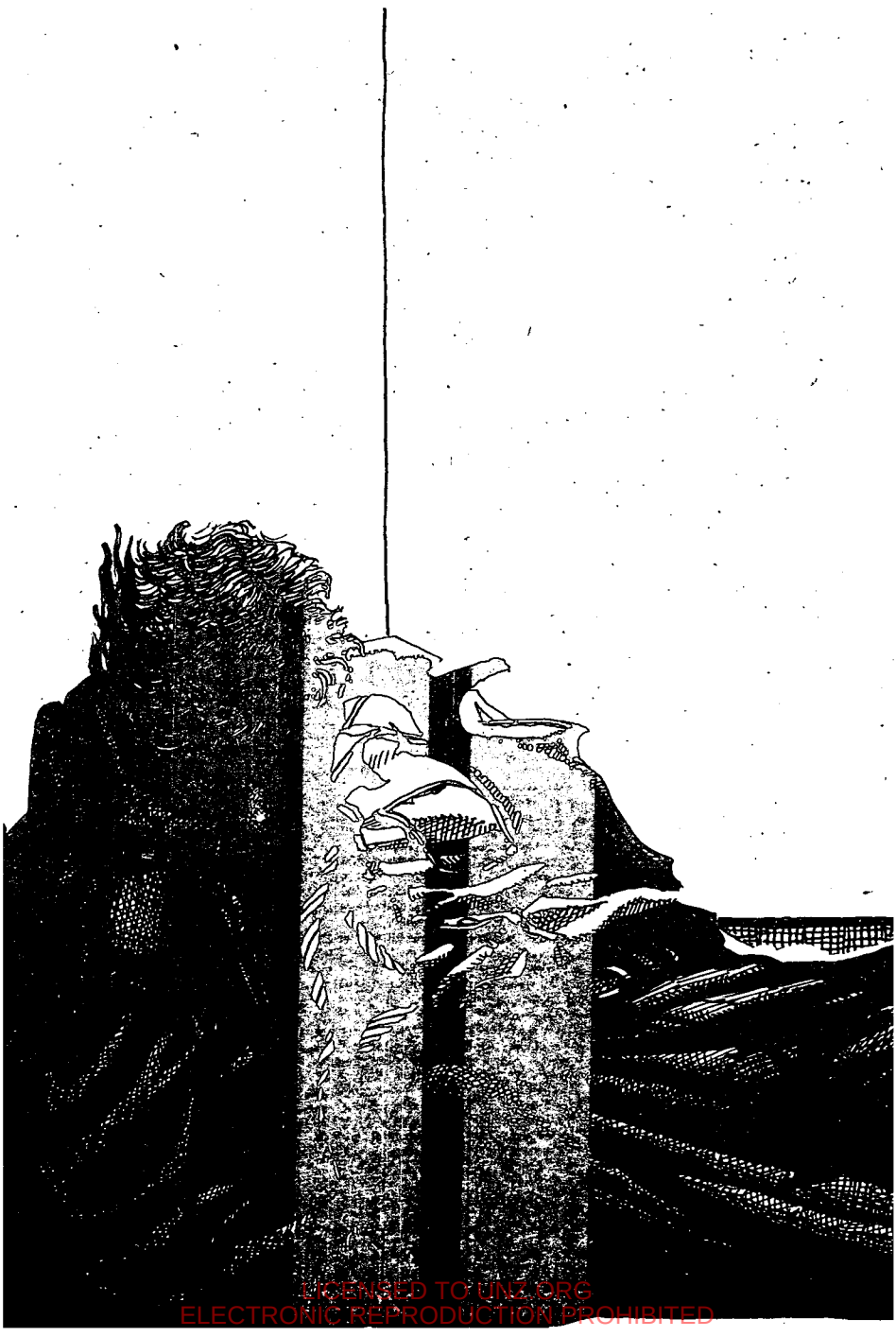

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arships and work-study, and a Ph.D. years later than most.

"No, I'm not criticizing. You were lucky. Dammit, Marilyn, I like you; I'd hate to see you in something like that, peddling babies. But something's going on—" She glanced at Rickie's body again. "If that's natural death, I'm a blue-eyed blonde Swede. I saw enough of that on the street. So—you don't sell embryos, and you didn't kill him, and you don't know who's selling your tissue or who did—is that your story?"

"That's the truth," said Marilyn steadily.

"Truth or not, don't change a story once you've started," said Ginger. She flashed a quick startling grin. "Them as don't ask don't get lied to; you'd best watch yourself, Dr. Lewis."

"But—"

"Now we call Security. And you'd better stay here; they don't like it if people leave the scene." At Marilyn's puzzled stare, she elaborated. "Security is cops; cops is always cops—that's street, but true. You leave a murder scene, they'll wonder why."

By morning, Marilyn Lewis felt she'd been awake a week, not just one night. She had endured the disbelief of Security ("You mean you're a doctor, and you can't even tell what killed him?"), the pettish annoyance of Jennicott, who dithered in a crisis exactly as she'd expected, the clumsy attempt of Ken Murry to "protect" her from the strain, Ginger's apparent contempt ("What'd you expect? Kid gloves from the iron hands specialists?"), and the nervous backbiting of other staff who seemed to think she'd arranged Rickie's murder just to cause them trouble. Kinsey, on being told, had turned white and dropped a tray of culture plates (luckily empty); Marilyn told her sharply to go lie down somewhere. She left, and returned only just before shift change, quiet as usual. Third shift was so obviously excited by events that Marilyn didn't bother to try springing the wastage problem on them; she knew she could tell nothing from their reactions. That whole shift was wasted anyway. First shift's loss of tissue meant that third had little to do, and Marilyn spent most of her time with Security or staff.

Padhari arrived fifteen minutes before first shift, as usual, and smiled when he saw her in her office. "Ah—today we can make up for yesterday, eh?"

"Not quite. Come on in." In a few brief sentences, Marilyn outlined what had happened, both Rickie's death and the missing embryo tissue. He shook his head.

"I don't know, Dr. Lewis. This hunger for babies—it's normal, of course, but—from our unit?"

"The tissue's missing. If it wasn't used for transfer, then what?"

"I see. You've checked the monitor efficiency—yes, of course, you would. When we dumped yesterday, you were checking—" Padhari was sharp enough, but he had no desire to be a principal investigator, So he'd often explained: he had no liking for "the politicals." "It cannot be this shift. Too many people around—anyone would notice the transfer chambers in the halls or elevators—or even a visitor."

"Visitor?" said Marilyn idly.

"Yes—well—of course the easiest way to take an embryo out is inside a

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woman." Marilyn stated at him, and kicked herself for not having thought of that. She knew it; had known it for years, but it had become background information, rarely called on since she did no transfer work herself. No clumsy transport chambers, no need for the oxygen tanks, the filters, the temperature regulators, not even the simpler but still conspicuous nitrogen tank for frozen embryos—just slip the embryo into a waiting uterus.

With that thought came another. It didn't even require a visitor. Serial transfers weren't done in humans—but not because they couldn't be done. Large animal embryos were routinely transported in utero—serially transferred from one to another—even other species—until the final surrogate.

"It could be," Padhari went on in his musical voice, his eyes carefully averted, "that no visitor would be needed—"

"I just realized that," said Marilyn.

"It would take skill," he went on. "Someone to do the transfer—it would be difficult to do on oneself—"

They stared at each other, appalled. "Second or third shift," said Marilyn slowly. "Either a woman comes in—and I agree that's less likely—or a woman from the Institute—and probably from this lab—carries the embryo herself."

"Kinsey?" asked Padhari, then shook his head. "That one lives quietly, needs nothing, has no lovers."

"You know her that well?"

He shrugged. "She is always on time; we have talked a little, of my family, of my home. She has no envy—a rare thing, Dr. Lewis. It would require the need of someone she loved, if she loves anyone."

"Then Ellison or Peters on third shift," said Marilyn. Her heart sank. She liked all her staff: Kinsey for that cool efficiency, Ellison for her cheerfulness in the midst of the night, Peters for a luminous intensity, a total immersion in research. Which? And why? She could imagine Ellison's needing money; she'd seen Ellison's locker bulging with clothes, a new coat every winter, bright-patterned sweaters, colorful scarves. Peters was a half-time student, working this job and another: she needed money. But she had seemed so interested, so committed to the research. Marilyn shook her head, clearing it.

"We don't know yet, but we will," she said to Padhari. "Meanwhile, we need to salvage what we can, or we'll lose six months work. If we start today, we can be ready to repeat yesterday's work by Tuesday. If you'll set it up, while I deal with this—"

"Of course, Dr. Lewis," he said. "I shall be glad to do that." He gave a jerky little bow, and disappeared toward the lab. Marilyn thought for a moment of calling Tony Baker at home. Surely he should know—surely Jennicott had told him. She wavered, and finally put the phone back down. If he didn't know, it wouldn't help his recovery to hear it. And she needed every spare moment to prepare for that afternoon's conference, the quarterly grant review which always sneaked up on her blind side.

To her surprise, Ken Murry chose a seat across the aisle from her in the small presentation room. She smiled at him; his lips quirked but he looked away. No one sat near her as the room filled. She felt almost guilty, as if she had done

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whatever they suspected. When Ginger Harkness came in as Jennicott was moving to the podium, and sat down only one seat away, Marilyn felt the shock. Ginger piled a stack of micrograph cartons in the chair between them, and topped it with two clipboards and a spiral-bound book. She leaned over the pile and whispered, "Now I have something to show—just wait." She winked at Marilyn, who felt her tension ease a notch.

Jennicott coughed, the social cough of a busy man, and Marilyn started. Ginger leaned back in her seat, obviously unconcerned. The meeting opened with the Virology Division reports. Marilyn drew spirals in her red notebook, pretending to take an interest. Dick Stovall had another 100,000 base sequences of H-131, and a preliminary draft of the paper going to *Nature* concerning the protein superstructure it coded for. The doctors Armand (Phyllis and Joseph) had to admit that their computer simulation had bombed, but argued quite well for continued funding of the project: conversion of language might get it done. Someone she didn't recognize showed a lot of slides covered with illegible labels.

From Virology to Embryology the reports went in the usual way: research going well, going slowly, stymied; papers in progress, submitted, just out; cost overruns, projections, surplusses (only one of these). Ginger carried the entire pile of micrographs to the podium, and explained (or so Marilyn assumed) how her computer graphics program interfaced with the different imaging technologies to reveal molecular structure. Some of it Marilyn recognized, but some was so far from her own field of interest that she could make nothing of the what she saw. The front row—Congressional aides, Institute administration experts, two science reporters for major publications—took copious notes, even though the official reporter would provide a transcript of proceedings. Then Ken Murry got up, and loomed over the podium to give his report.

Marilyn hardly listened. She knew as much about Ken's research as she wanted to, and it had nothing to do with hers. But as the room achieved the silence of shock, she tuned in again.

"—in short," Ken was saying, "as I've mentioned before, I strongly believe that chimaeras are a better model for this type of research than human embryos. Now that it's possible to provide specific tissue types in the desired genetic mosaic—"

Marilyn stiffened. She couldn't believe it. He had taken advantage of her problems to fight that old battle.

"—less emotional turmoil," he said. "Public resistance to human embryo research continues, and the existence of embryos unavailable for transplant fuels resentment among infertile couples. As well, those who fear a eugenic takeover consider the existence of thousands—no, hundreds of thousands—of cloned embryos as proof that scientists—we, that is—are trying to eliminate so-called normal humans with 'test-tube monsters.' It's precisely this public turmoil which the use of chimaeras can prevent. No one considers even the protohoms human—"

"Just a minute!" Marilyn's anger overcame her manners. "You—"

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"Please, Dr. Lewis." Jennicott had turned quickly to silence her. "This is Dr. Murry's presentation."

"Yes, but it—" She shook her head, furious, and settled back, seething. Ken gave her a long steady look before continuing. She had heard the argument before. She and Ken had fought it out for the past ten years or so—his wanting more money for chimaeras, his personal fascination. She had been able to show more results more quickly, working from pure human tissues, truly human embryos—biologically human, she thought quickly. Not human in the sense of persons, of course. But obviously an embryo of completely human genome would provide more and better data about human development, human genetics. And he didn't know even now if he had a stable triplet, a selective triplet.

He argued from the protohoms, as she'd known he would. Not true chimaeras, the protohoms were—had been named—illegal. All had been killed. But she had to admit that the research on tropical diseases, based on the protohom models, had been extremely valuable. She suspected that he was trying to reintroduce them, create them by making a protohom chimaera, so to speak, instead of true hybridization. The legal definition of human genetic material was just vague enough—she thought she knew how he could get away with it. But she hadn't asked, not wanting to know.

"I am requesting a reconsideration of grant allocations," he finished up, not looking at Marilyn. "In view of the present situation in Embryology, I feel that the sooner we change to a chimaera model, the better." He nodded and returned to his seat, still not looking at Marilyn.

When Jennicott called her, after Praed had blundered through an incoherent report, she was still angry. But Ginger's warm smile steadied her. As Ken had avoided her eyes, she avoided his.

"First," she said crisply, "I want to give a brief report of progress." She had prepared duplicates for the front row, and this went quickly: a successful insertion for thalessemia resistance, a new line of clone high-survivors that nearly doubled embryo quantity, and a paper accepted by *Human Embryonic Culture Techniques*. "As for internal matters," she went on then, "I was informed by Dr. Jennicott that these would not come under discussion this afternoon. However, Dr. Murry's request for grant reallocation makes some mention mandatory.

"While it is true that the existence of substantial human embryonic tissue is tempting to opponents of human research, the value of such material for research clearly outweighs the problems involved. Even a stable, tissue-specific human/nonhuman chimaera—which I assume is Dr. Murry's preferred model—cannot provide the range of response which a 100% biological human embryo can. As you know, much of my research involves interactions between tissues: control mechanisms that may span several organ systems, for instance. We now have an economical, reproducible biological model for this research: the cloned, biologically human, embryo. Before chimaera research could be beneficial to humans, it would have to be used on a human model. It is much less

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expensive, and much quicker, to do such research on human embryos in the first place."

"But how do you control the embryos?" asked one of the front row. Marilyn recognized a Congressional aide.

"With ID numbers, and records. The protocols were set up originally by NIH, and are in both the grant proposals and the initial publications."

"But if someone—I mean—" he said, with a fast look at Jennicott, who was making shushing motions, "—if someone wanted to steal—"

"I don't know if you're aware," said Marilyn slowly, "that all embryos are required to be biologically inactivated at the end of an experiment?"

"You mean killed?"

She allowed herself to smile. "More than that; they're research material, as you know, and it's illegal to implant a research embryo, even if one were available. In order to make certain that it couldn't happen, certain genes are altered—in the course of research—so that—"

"Oh, I see." He settled back in his chair, taking the hook. "Even if someone stole an embryo, it wouldn't survive to term. Is that what you're saying?"

More or less, thought Marilyn, and simply smiled.

She tried to get away before anyone spoke to her, but Ken moved quickly to the door, and caught her arm.

"Listen, Marilyn I had to—you know what I've always said—"

"And you know what I've always said. Dammit, Ken, it's a dirty trick to play—using this to change grant allocations!"

He shrugged. "Name of the game. You've had it fat for years; I've got to try. These chimaeras are worth it; they—"

"I don't care." She pulled loose from him, and strode quickly to the elevators.

Kinsey arrived on time for second shift, as always. The boss had been unavailable; after Rickie's death, she'd almost expected that. Was it murder? Had someone else figured it out? She signed in, and hung her coat in her locker. There'd be plenty of work to do without Rickie. While Padhari explained what he'd set up, she took notes, as usual.

"Can you work alone, Miss Kinsey?" he asked. "Will it bother you, the lab being empty?"

She shook her head. "Where's Dr. Lewis?"

"The quarterly grant committee meeting. She said she would go home from there, after last night."

"I see."

Padhari looked at her, she thought with sympathy. "I think, Miss Kinsey, that you should not be here alone. Have they said to you that they think Mr. Dunkett's death was intended?"

"No one's said anything, Dr. Padhari. Intended—you mean suicide, or—"

"Murder. They have not said suicide. But you must not stay alone. Dr. Lewis mentioned the wastage problem?"

"Yes."

"Yes, well—it is for your own protection, Miss Kinsey. When no one else is here—it is not that we doubt your word, you see, but you should have someone else in the lab."

"Well—" She tried to think. All she

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could think of was the couple on Tuesday. She looked up as the door opened and Dr. Lewis came in.

"Ah—Dr. Padhari, you're still here. Good. That so-and-so—"

"Please?"

"Ken Murry. Used this as an excuse to argue switching to a chimaera model. Kinsey, I'll be here until about midshift, and I'll be getting you some help. We've set up a full work schedule to try to make up for yesterday's losses."

"I saw that."

"Yes, well—have you worked with any of the other students—other than Rickie, I mean?"

"Stacy—Stacy Peters, she's come in early sometimes. On first shift—not really. I know some of them, but—"

"I'll call Peters, and see if she can come early—she could leave midshift on third, and if someone came in early to be with Ellison—"

"I can do that easily, Dr. Lewis," said Padhari. "I think we should have staff, or someone senior like Kinsey, here around the clock."

"You're right. Damn, I wish Lee wasn't in Europe." Their colleague, Lee Dunstan, was attending the Common Market biomedical research conference and wouldn't be back for another week.

"When will we be making the big section transfers, Dr. Lewis?" asked Kinsey.

"Hmmm? Oh, Tuesday. If all goes well, and it had better."

Dale could not call the contact until nearly midnight. No answer the first time. On the second call, a voice he hardly recognized.

"Yeah?"

"It's Dale. Listen, I need to know—"

"Dammit, it's canceled. He told you—the boss said—"

"You can't do this." He knew as he said it that they could. "We paid—"

"That's not—" He heard a couple of odd sounds on the phone, and then the voice returned. "I can't talk now. It's not a trick; we've had problems. It's not safe now. We'll call you. But not Tuesday; it's canceled."

"No! I want—" But he was talking to an empty line. He slammed the receiver into the cradle and went back to the den where Paula was curled up, knitting. He stood watching a moment, and almost wished he could drop dead at her feet rather than tell her. She looked up and he saw her face stiffen at the sight of his.

"Dale? What is it?"

"Problems." He came over and took the hand she held out. Her other hand went to her belly, protecting what had never been there.

"The—the baby?"

He nodded. "Paula, they said—"

"They want more money."

"No. They said some kind of trouble. They said—"

"Not Tuesday?"

"No." He watched. No tears yet, just a quiver across her face. He wanted to smash something, throw things: she sat too quietly.

"Not Tuesday. Maybe not ever." Her voice was soft, softer than usual.

He wanted to kill them, the bastards, the ones who had stolen his children—he thought of the doctors' reports. Low sperm count, low motility—and when he asked why, they shrugged and showed

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him all the things that could do it. The lawns sprayed with one chemical, the orchards with another. Something for the shade trees in the park, something in the water, in chemistry labs (but more likely, they said, the year he spent on his uncle's farm, when his folks were killed).

"I want a baby," she said. He thought of her, of the other reports. Was it the day-care worker, or the seventh-grade gym teacher? Who had given her the infection that scarred her tubes? She looked at him, and now the tears came. "I want *my* baby," she said, crying softly, trying not to upset him. "Just a baby—my baby—just what my mother and grandmother had, all the way back to the beginning." He held her, fighting his own tears, wanting his own babies too. At least she could pretend, could feel that what grew in her was hers. He had no chance at all.

"You'll have a baby, love," he murmured, soothing her. "I promise. It will be OK. I promise."

"I want names," said Jennicott, lips folded primly. "I want names and backgrounds." Marilyn Lewis and Dr. Praed sat each in a red-cushioned chair across Jennicott's wide walnut desk. Not his, actually; it was Tony's desk, and a family heirloom: real walnut, actual wood. Marilyn wondered if he'd found the secret drawer yet, the one Tony had kept chocolates in. She wasn't going to tell him.

"I have names," said Praed. He handed across a list. "I assume, Dr. Jennicott, that you have gone through the same computer analysis that I did: mismatches occurred on second or third shift. Nonetheless I have included first shift personnel because these sometimes substitute." Jennicott looked over the list slowly, running his finger down the pages. He looked up abruptly.

"Dr. Lewis?"

"Here." Marilyn slipped her list across the desk. He glanced at it and then back at her.

"Any further word on that poor young man?"

"From Security? No—they'd tell you first anyway."

"Perhaps. Not suicide, they told me."

"He certainly had no reason to." Marilyn took a breath. "My time analysis showed much the same as Dr. Praed's—whatever happened happened on the fourth and fifth sampling intervals, on the dates listed. That corresponds to mid-second through mid-third shift, on days when we would normally have a high wastage anyway."

"Any suspects?"

"I am not a detective," said Dr. Praed sharply. Marilyn glanced at him. "I am not a political person, and I have nothing to do with this—this ferreting out of any so-called suspect. I have only employed people in my lab that I trust, that I know do good work. If it is true someone is doing this criminal thing, then it is for the professionals, the police detectives to find out."

"But if we could avoid involving the police—" suggested Jennicott. Praed became even stiffer, if possible.

"Even in this country there are worse than police, Dr. Jennicott. To avoid the police, you would use—what? Private, unskilled detectives? Suspicion among colleagues? You saw what happened to

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Dr. Lewis in the grant meeting—and, Doctor, had I not already been seated where I could not readily change my place, I would not have left you so—" He gave Marilyn a look that heartened her, though she could not have said why.

"He's right," she said quickly. "Murder—that's police business, not ours. And this must be tied in. Tony would say that, if—"

"But Dr. Baker is not here." Jennicott's deprecating smile looked sour. "It is my responsibility, and so far I have regarded the Institute's honor in this—"

"Honor!" Marilyn and Praed spoke nearly together. Praed went on when she hesitated.

"Sir, there can be no question of honor when someone has been killed. You assume now it has something to do with this other—but it may not. Had I known you had not called the police, I would have done so myself."

"I'm glad you didn't, Dr. Praed," said Jennicott heavily. "Very glad, for your sake—"

"Don't threaten me," said Praed. "Don't even try." Marilyn looked at him again, seeing the iron that had hidden so long in his meagre, colorless body. He gave her a sharp look that recognized her recognition and went on. "Sir, I was threatened before—before I ever came to this country, and perhaps you don't know that. I can be frightened, yes—but not by you. Death does not frighten me either; it is a warning, no more."

After that Jennicott seemed to crumple, returning to his usual dither, and dismissing them both after another look at the lists. But Praed refused to leave until Jennicott called Security and told them to file Rickie's death. Marilyn stayed too. They walked back to the elevators and rode up together. Neither said much.

The police investigators, predictably, were furious with the delay. They appeared at the labs looking, as Dr. Padhari said, like tigers in a goat herd. When they heard the same story from Praed and Marilyn—that Jennicott had authorized the delay—they stormed out. Marilyn felt laughter tickle her mind for the first time in several days. Jennicott was in worse trouble than she was, if the police could manage it. It was too bad Tony couldn't be there to enjoy it too—she decided suddenly to call him. His wife answered on the second ring.

"Tony? Oh, he's outside. I'll get him." Grace Baker, Marilyn thought, always sounded as if she were in a bubble-bath. She heard footsteps on a wood floor, a sliding door scraping in its tracks, and Grace's voice, blurred with distance, calling. Then a long silence, and footsteps coming closer. The receiver rattled in her ear, and Tony's crisp cheerful voice.

"Marilyn—how's it going? Why don't you ever come visit the invalid?"

"You don't sound that sick," she said, already smiling.

"I'm not sick. I never was sick. My heart just decided to take a vacation, that's all." He sounded like the old Tony, wide awake and ready to take on whole Administrations, anyone's administrations, before breakfast. Not at all the way she had seen him last, leaning on his desk and muttering "aw-

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fully tired, m'dear—awfully, awfully tired."

"Mmmm. Tony, have you heard about the—trouble out here?"

"Trouble? What's old goosefoot got into now? I told him just to hold things together *lightly* until I got back."

"He didn't tell you?"

"Tell me what? You want to send my BP through the roof, Marilyn? What is it?"

She took a long breath. What first? "You know the protein sensors," she began.

"Yeah," said Tony. "I approved those just before the attack—you know. It was in a memo."

"No," she said, wondering if he'd slipped a bit. "No, it wasn't. Maybe Jennicott forgot—"

"He didn't know," said Tony brusquely. "The memo was in my files—to go out that week, to all of you. But not Admin, not then."

"Oh. Well, anyway, it didn't come, and we only found out about it a few days ago." It was hard to think how few, right then. "He told us at one of the morning conferences—"

"The what?" Tony sounded angry, and Marilyn remembered that he had once sounded off about staff conferences at a national convention. Time-wasting idiocy, he'd called them.

"Jennicott," she said, starting to enjoy this, "has morning conferences two or three times a week."

"No!"

"Yes. All senior staff. And he told us about the protein sensors a few days ago, and we had a discrepancy."

A long silence; she could hear him breathing lightly. Then: "We *who* had a discrepancy? A shortage? An overage? What?"

"Dr. Praed and I both. We had signed lab sheets recording embryo wastage that the protein sensors didn't pick up."

"Embryo wastage." A shorter interval. "You mean—by God, you *do* mean. You're missing human embryos, Marilyn? You and Praed both?"

"Apparently. We've isolated it to one eight-hour period on about fifteen occasions."

"And who worked those shifts?"

"In my lab? Kinsey and Dunkett worked second; Ellison and Peters worked third. And that's the other problem."

"There's more? Alan knew this and didn't call me?"

"I didn't know that," said Marilyn. She took another long breath. "Dunkett is dead."

"Dunkett—"

"The junior assistant on second shift. Under Kinsey—"

"I remember Kinsey. Tough girl. Smart."

"Yes. Rickie came this past fall. Grad student, starting his thesis work this summer. Seemed a good kid. Anyway, he died the night after Jennicott told me about the discrepancy. I'd been working on the figures, checking the protein sensors, and Ginger Harkness found him dead in an elevator."

"Not naturally, or it wouldn't be a problem."

"No. They haven't said what it was, but Ginger thinks poison." She went on described what she had seen and done, and even (feeling guilty) Jennicott's reluctance to call in the police.

A long descending whistle, Tony's

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way of expressing emotion. "All I do is have a lousy heart attack, and the place starts busting out with organ stealing and murder. That damned Jennicott—"

"It's not all his fault, Tony—"

"The hell it's not. Nothing like this happened when I was around, now did it?"

But Tony always made her mind run faster. "So why did you agree to the protein sensors?"

"You're right. I wondered about things. I heard things. I knew we had a setup for implant thieves, if anyone thought of it."

"And someone did."

"Yeah. And Jennicott didn't tell me about it. And something else—Alan didn't tell *you* about the sensors until I told him."

"What?"

"That was—oh—two, three days ago. He called to ask about the quarterly grant report meeting, and I asked how the protein analysis of lab effluent was coming. He'd never heard of it—never bothered to query the computer, though it's one of the listed codes in my file. So I explained—and then apparently he got on it, and then jumped on you. Interesting."

"I suppose. But Tony, what now?"

"Now I think it's time for the eminent Dr. Anthony Baker to take up the reins he so carelessly dropped, that's what now."

"But you—"

"I was taking a vacation. I'm fine. I'll be there in two hours. Don't bother to tell Alan; I want to see his face." The phone clicked off, and Marilyn sat a moment, feeling a mixture of relief and apprehension. If Tony was really healthy, she wanted nothing as much as his reappearance—his usual quiet but effective leadership, his ability to make good decisions in a hurry.

Tony's eruption later that morning eclipsed even Rickie's murder. Marilyn heard later how he had come through the main entrance, hardly slowing for the Security station, and stormed into an elevator. He had flung open the door of his office to find Jennicott sitting behind his desk and two policemen leaning on it. She had the rest from Praed, who had gone with the detective who questioned him to be sure Jennicott kept his story straight.

In only three sentences, Tony had Jennicott out of his chair, and Tony himself back in it. Praed said that Tony began questioning Jennicott, the police, and him, as if he were a detective himself. And Marilyn's phone rang a short time later.

"Staff meeting at two," Tony said. "Sorry, but this is necessary." And he hung up before she could reply.

Staff meeting was definitely the old Tony, who firmly shut the door on the police officer who wanted to sit in.

"You haven't the clearance," he said. Then he looked around the long table. "All right. Here's what we have. Two labs definitely have tissue missing: Lewis and Praed. Both have checked, confirmed the discrepancies, and isolated a time that whatever happened, happened. Three other labs may have tissue missing; the amounts are too small to be sure. Two labs have gross overloads. The most likely thing is dumping leftovers down the drains, but it may be that whoever took the tissue

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from the short labs dumped what they didn't want into these. Here are the figures." He handed out a single-page listing. "You also know that Rickie Dunkett, one of Dr. Lewis's assistants, was found dead in an elevator by Dr. Harkness. He was poisoned; I got confirmation from the police just now. Jennicott had sense enough to have the right tests run. It is possible, according to Dr. Lewis, that Dunkett was involved in the tissue loss from her lab. If so, it is possible that he was killed for that reason: either for doing it, not doing it well enough, or scaring a confederate." He sat down abruptly, but vigorously.

"I don't see any of my senior scientists selling illegal tissue," he said quietly. "If any of you are, I suggest you come to me quietly, in the next 24 hours, and we'll take care of it quietly. The police, of course, are investigating Mr. Dunkett's death, and any of you who have light to shed on that should speak to them. Those whose labs are not involved, try to keep your assistants out of the way, and get on with your research. Those whose labs are involved, if you need additional assistants to keep things on track while you investigate the problems, let me know. We always have kids looking for work in the Institute; we can help out. By the way, Dr. Lewis, I have a replacement for Dunkett—a third-year medical student, if that's all right. She's been working in Dr. Kearns's lab over there, and he says she's very good with embryo cultures. OK?"

"Fine." Marilyn wouldn't have argued then if he'd gotten her a computer technician.

"I'll be in my office, or available by intercom the rest of today," Tony said, standing once more. "And tomorrow, if anyone wants me. That's all."

With Tony back in his office, the Institute settled into uneasy routine. Tony and Marilyn made a brief news tape answering questions about the murder; she hated that sort of thing, but Tony insisted that she had to appear, however briefly. Marilyn found the medical student as good as Tony had promised; Kinsey accepted her without comment, and by Saturday they were clearly on track for Tuesday's planned transfers. Marilyn accepted Padhari's offer to come in on Sunday, and took the whole day off.

Monday seemed almost normal. No morning staff conference, just an hour looking over the weekend reports. They had chosen to spread the transfers out more, just in case. Marilyn checked on supplies, and found that everything was ready—all the media made and autoclaved, all the glassware, all the instruments. Tony poked his head around her door shortly before noon to report that everything was quiet all over.

By midshift Monday, Kinsey had still heard nothing about Tuesday's embryo transfer and transplant. Surely it was canceled—but why hadn't the boss said something? She did her work with only one corner of her mind on it, kept an eye on Laura, her new assistant, and tried to decide how to handle this. She couldn't believe the boss had killed Rickie. He wasn't the type for that—though poison, if he killed, would be his way. That doctor might, but how would he get in? They would have plenty of tissue tomorrow, and if the lab transfers were done on time, she'd have

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plenty of time to take a couple. But it was too dangerous; she didn't want to.

The police had questioned her closely about Rickie, but seemed to accept her meagre information. Perhaps they knew that in most labs an established assistant had little to do with students, who came and went every semester. They must have checked; they'd know that she lived alone, that she spent little, and nothing beyond her salary. The money the boss had paid her—a scant tenth of what he received—she'd given to Ann, in cash, the way she received it. Ann's husband made plenty, and the gifts to various charities would startle no computers coming from that house . . . not that anyone cared, since such gifts were no longer income tax deductions.

She had tried to see the boss several times, but she had no real business in Administration. She was not the sort to spend her break time chatting with secretaries, and everyone knew it. Surely he would call her, tell her what to do—Kinsey stared absently into space for a few moments. If she failed him, he would expose her initial theft—that was the threat that had kept her doing this so long, at least until Ann's baby was born alive and well. But now Ann's baby *was* alive. They couldn't destroy that—she was sure of it—and now what could he do?

"Kinsey?" Laura's soft voice broke her concentration.

"Yes?"

"What do you use here for invalidation?" For a moment, Kinsey didn't understand. Laura went on. "So far these embryos are open, aren't they? The readouts look like it. Don't you invalidate them before the gross transfers?" They didn't call it that, in the Institute: they called it limiting.

That was what had alerted Rickie, too. By-law, all research embryos had to be biologically unstable, incapable of survival even if (by some remote chance, the lawmakers intended) they got into a human uterus. But for Kinsey's purposes, the embryos had to be stable, viable. Luckily, the experiments Lewis was doing required open embryos most of the way; they had agreed, with permission from Tony Baker, to leave them open until the last transfer step. But plating the clones out was intermediate, as she told Laura, whose worried expression eased only partly.

"But couldn't they—I mean, what if someone took one, or something?"

"They're open. They'd live—I guess. Though these are sicklers, the alternate gene line to the one Perovski worked with. But that's why we're so careful." She had said nothing to Laura about the missing tissue, and (according to Lewis) no one else had either. Not officially at least. It bothered her, though. Laura was too smart, smarter than Rickie, a different kind of smart. She might even recognize that the blue threes weren't sicklers at all, but a line known as Columbia-367, as clean a genome as you were likely to find in North America.

"But legally—" Laura went on.

"Legally, Dr. Lewis told me, we're clear because she cleared it with the Ethics Committee and the Director, Dr. Baker. We limit—invalidate— whatever—after the gross transfer, when we go to the artificial placentae; it's maintained by a non-psysiologic zinc balance."

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"Oh—that's neat. We use the old citrate trick."

"Well, that would foul up some of Lewis's work. She published an explanation about five years back, I think it was, in the Academy *Proceedings*. Ask her for the reference; she'll show you."

"She wouldn't mind?"

"No—not Lewis. She's very open." And that was true, though Kinsey had found that openness galling at times. How anyone could be so willing to discuss and explain, and so unwilling to listen . . . It was almost funny, in a strange way. Lewis had let her go early the day Ann had her baby, had wanted to see the pictures when they came back. Yet Kinsey was sure she'd never admit that it was right—or even possible. She shook her head, tightening her lips against the temptation to smile, and went on with her work.

On Tuesday morning, Dale decided what to do. He had heard about the murder at the institute; the victim's identity meant nothing to him, but the name of the lab he worked in did. That must have been the "trouble," that must be the connection. But it wasn't his fault, or Paula's, and the money had already been paid. On the phone, it had been a man's voice. The lab was run by a woman, according to news reports: Dr. Marilyn Lewis. She ought to understand, if she wasn't behind it anyway: He called the Institute. Dr. Lewis was working and could not be disturbed, but she would be free for appointments after 1630. Dale looked at the city map, and made an appointment for 1730. He had to give a reference, but his employers' firm, General Data Development, seemed to satisfy the secretary.

Marilyn and Padhari finished the last of the transfers on schedule. She had a four hour break before the next sequence, several hours into second shift. They came out of the lab tired, stripping off their gowns and masks. Padhari refused a cup of coffee in her office—he wanted to be home in time for his son's game, he said. Marilyn sank into her chair and kicked off her shoes, gulping half a cup of coffee before she noticed the blinking light on her computer screen. Message waiting. With a sigh, she leaned forward and punched the keys.

Appointment for 1730 with a Dale R. Ivington, from General Data Development. She punched up the general information base, wondering what General Data could want. They weren't pharmaceutical, that she knew of . . . the screen filled with data. Modeling software for engineering firms, mostly, and graphics packages for science. Did they have her confused with Ginger Harkness? Perhaps they wanted to model embryonic development, though they'd have to work hard to better the MassGen system (misnamed, as many things were in science: it had been developed at Sloan-Kettering.) Or protein function; she remembered possible extrapolations of their last paper. She looked at the organization chart: Dale Ivington wasn't listed, but the chart was (she checked the date) almost a year old. A new man, then, looking for a new project to head. That made sense. She confirmed the appointment, which automatically cleared him with Security downstairs.

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When Kinsey and the medical student arrived for second shift, Marilyn told them about the appointment. "We'll do the next transfers after that," she said. "Slow them down a little, Kinsey—just in case I'm delayed."

"Cool, or—"

"Cool. If we make the transfer later, that doesn't matter. I don't want to lose the whole batch, though, if this is important enough to stay with. It may be: usually their people don't work this late." Kinsey nodded, and withdrew.

The tap on her door came at exactly 1730. Marilyn had more coffee ready, and a plate of real chocolate brownies from downstairs. It never hurt to feed them, she'd noticed early in her career; as long as she didn't have to cook herself, she was willing. She called "Come in," and a tall, fit-looking man in a good suit entered with a briefcase.

"Dr. Lewis?" Dale had seen her on the telecast, saying that Rickie Dunkett had been a student assistant in her lab, and had appeared normal. She had conveyed authority then, in white lab coat and surgical cap, but now she looked more like his mother-in-law: an educated, cultured woman, fair-haired and slender. He knew he was sweating, and hoped it didn't show on his face.

"You must be Mr. Ivington," she said. He seemed nervous; had he thought this up by himself, and come to her without corporate approval? "Have a seat—would you like some coffee? Brownies?"

"Thank you." He accepted coffee, and sat on the edge of his chair. "Dr. Lewis—you work with human embryos, is that right?"

"Yes, of course. We have a number of projects in hand; right now the main thrust is on embryonic development of tissue-specific diseases. Of course we're trying to learn how to control those diseases."

"I see." He clearly did not understand a word of this, and Marilyn wondered again why he had come. He gulped coffee, then set the cup down. "Dr. Lewis, can you explain to me why Institute embryos are not made available for transplant?" He had thought this question out all day. If she were part of the deal, she should react—and if not, she wouldn't know that he was.

Marilyn stared at him. Her first thought was that he was a reporter, someone from the local TV station trying to get a surprise interview. She answered slowly, and thought how best to call for help.

"In the first place, Mr. Ivington, that would be illegal. A scientist who used research embryos for transplant to infertile women would be out of a job and in prison. In the second place, it would be unethical: a clear violation of my contract as a researcher, and of my duty to the world of science."

"How?"

She frowned, but went on. Surely he had a recorder in that briefcase. "You're aware, no doubt, of the law's intent. Research embryos have been changed by research: we treat them chemically, we do surgery on them. They aren't, in that sense, normal any more. Some people fear that the research we do on diseases would induce diseases, leading to problems in the human gene pool if these embryos were allowed to develop. Related to that is the idea that scientists are trying to breed a super-race. Of

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course, that's absurd. Evolution is doing quite well, has been for millennia. We do want to remove some dangerous genes, but no one's trying to make something new. But all this lies behind the law as it's written—concern that women who receive human embryo transplants will receive only natural embryos, unaltered by science: neither deformed, diseased embryos, nor supermen."

"I see." He seemed to have relaxed a trifle, and his face held intelligent interest. "But if there were no legal barrier to such action, would you still find it unethical?"

"Oh, yes," said Marilyn, nodding vigorously. "I am a research scientist, not a clinician in infertility. I must have thousands of embryos to work on, if I'm to find out anything. Suppose they were available for transplant. Every time something went wrong and we had wastage, I'd be defending myself against a charge that I murdered potential humans. Ridiculous, but that's how the public is. Right now, the law defines research embryos as human biological tissue, non-viable, and thus not human in the sense of human rights or responsibilities. That means that I can pursue my research—which may end in saving thousands of lives—without interference. And I am not tempted to make a profit off my work, as I might be if I could sell some of the embryos for transplant. As it is, I have grants that support so many embryos a year, and I make sure they're all used in the appropriate research." She leaned forward. "And now, Mr. Ivington, I'll have to ask you what you came for. We have more transfers to do this evening, and—"

She was looking into the end of a weapon. It looked exactly like the ones on TV and in movies: the round opening, the metallic, slightly greasy shine. She stopped, mouth open.

"I want an embryo," said the man, his voice shaking slightly. "I—I paid for it, and I want it, and you're going to give it to me." He would not have pulled the gun on her, but that voice—that tone—when she said the embryos weren't really human, and he thought of all the babies, the "wastage" as she'd called it, flushed down the pipes . . . it was too much.

Paid for it? thought Marilyn. *He's* one of them—one of them taking my embryos. Suddenly she was angry as well as afraid. "What do you mean you paid for it—as a taxpayer, or—?"

"I mean I paid—someone—in this lab—" He was sweating heavily, hardly able to speak. "He—he promised me. My wife—she's been on hormones, getting ready—we paid months ago, and she can't—I won't let it happen. You've got to give us one, you've got to!"

"Who? Who did this?" Marilyn reached for the phone buttons; but he waved the gun and she stopped, her hand in midair.

"I—I don't know. Some man—I've only talked to him on the phone, and the doctor—the one who'll do the transplant. But they called and said it was canceled. Canceled! You've no idea what that means—my wife—!" Now he was crying, tears streaking his face, but the gun still firm in his hand. Marilyn pulled her hand back down, clenched it with the other on top of her desk. *This* was the kind of person who wanted her embryos. This unstable, ignorant fool.

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It made her sick. But he was still talking.

"You don't know—what we've tried. No adoptions—we tried the government transplant lottery; that took three years—*three years*, Dr. Lewis, and the fee isn't even refundable, and then we didn't get a chance. And you can't try again for ten years, and by then we'll be over the age limit. And it's not our fault! Me—chemicals, they said—showed me a list as long as my arm. Paula was molested in daycare, she was only a kid—was that her fault? No—but we want a kid, Dr. Lewis. Hell, my family, hers—all the way back to whenever men were men, our families have had kids, or we wouldn't be here—and now they say no." He bent his head, still crying.

She was appalled. She had never thought of it that way, never wanted to think of it that way. People who were infertile—she thought of drug addicts, hereditary genetic malformations, damage from gonorrhea (easily avoidable), chemical damage—that happened to those who shouldn't have children anyway. The world was full of people—too full—and anyway, it wasn't her field.

She looked at the top of Ivington's head, the dark hair thinning on the crown. A good solid citizen, she had thought when he first came in. Three-piece suit, good-quality briefcase; he might have been a colleague. If he'd been approved for a government transplant, then he and his wife had passed a battery of physical and psychological tests. That's what she'd read. Either the tests had missed his craziness, or—she didn't like the alternative. And he still wanted a child that much—or his wife did. She wondered what his wife was like, surprised herself with that thought. His head came up slowly; she saw the quivering muscles of his cheeks.

"I want my child," he said firmly. Behind him, the door had opened, and Kinsey's startled face stared at Marilyn. "My embryo," he went on. "I paid—it's mine—and I'll blow you away, I swear I will, if you don't give me that embryo."

In that one startled look before she moved, Marilyn saw in Kinsey's face the full understanding of his speech. Then Kinsey jumped, wrenching his arm up and over his head, her other elbow slamming into the side of his neck. The gun flew wide, banging into a file cabinet, and the man slumped in his chair. Marilyn sat as if she'd been hit just as hard.

"Kinsey—"

"Yeah. Yeah, I heard. Someone offered him one of ours, and he took the offer and came to collect. And yes, Dr. Lewis, I did—" She turned, and shut the door firmly behind her. "I did take some embryos. I'll resign, or you can fire me, or whatever. But first let me tell you why."

She had realized it from Kinsey's look, but hearing it was still a shock, impossible. "But Kinsey! I thought you—I thought you understood; you've worked in labs since you graduated, you—"

"I have a sister." Marilyn stopped, then, waved her hand, and settled back to listen. The man in the chair snorted, and shook his head. Kinsey walked over and picked up the gun distastefully, dropping it into the waste chute in the wall. "I have a sister who couldn't have

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kids. You don't know how that is, Dr. Lewis."

"He was telling me." It was hard to think. Kinsey, of all people!

"Yeah, well, it's that bad or worse. Ann—it wasn't her fault, or Tom's, or anything but the rotten world we live in." Kinsey paused and took a long breath, jamming her hands into the pockets of her lab coat. "You know, at first I didn't mind it here. I called it tissue, just like you did. I never thought of them as human. But when Ann told me what happened to them, when she kept asking why there weren't enough embryos to transplant—then it got where I could hardly flush them away."

"You should have told me."

"Told *you?* A staff scientist? After the lecture you gave when I started? You didn't want sentimentality, remember? And I needed the job; if I'd told you would you have recommended me for another?" Kinsey searched her face, and Marilyn knew she saw the truth: no. Kinsey nodded, as if Marilyn had answered aloud, and went on. "There was nothing you could do—or would do. So I dumped tissue, and thought I was killing babies, and Ann couldn't get an embryo. When you ordered those Columbia-strain clones, that finally did it. I told Ann I'd get her one. We practiced the transplant at her house—"

"You did it yourself?" Marilyn was stunned, but Kinsey merely smiled.

"Who else? We'd read up on it; you know I have good manual skills. It took several tries, even so. We had trouble getting her the right drugs to synchronize."

"Did she come here?"

"Oh yes. Once every week or so, to have supper with me on my break. Security never bothered us; they knew me, and Ann's IDs are current. We said her husband was traveling on business, and she'd show up with a pizza or something. Anyway, I did the transplant, and the last one took."

Suddenly Marilyn's mind jumped. "You—is that the baby I saw—the pictures you brought?"

"Yes." Kinsey's mouth twitched. "Normal. He's a month old." Kinsey looked down at the man slumped in the chair. "I don't know this one. He contacted someone else."

"It was a man," he said dully. "He called me, last week—"

"When?" asked Marilyn. Something gnawed the edges of her mind, demanding attention.

"Monday night—no, early Tuesday morning, about 0230, I think. A phone call, saying it was canceled."

"But that's when—" Marilyn looked at Kinsey. "Was Rickie in this too?"

"Yes—he had to be, he started asking about the limiting factors, and why we put them in so late. The—the boss said he'd better know."

"Boss? I thought you said you did this for your sister—"

"Please." Kinsey sat on the edge of the desk, and looked down. "I started with Ann—my sister—and that's all I meant to do. But—I was caught. We were. The—the man—"

"Who!"

"I'm coming to that. He said he'd tell you—see that Ann was aborted and sterilized for getting an unlicensed transplant—unless I helped him. That was last summer, early in the summer."

Marilyn could think of nothing to say.

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Words she'd overheard and never thought of sprang up in her mind; for the first time she understood Ginger's occasional bursts of obscenity.

"You won't believe me when I tell you who it is," said Kinsey steadily. "But I had already decided, after last week, that it was too much. Ann's baby is alive—and by law it's hers, now. They can't change that. The doctor who followed her pregnancy doesn't know; he delivered her, signed the birth certificate. She's safe."

"I—shouldn't we call the police? Or security? Or—" She looked at the man sitting quietly in his chair, apparently harmless now.

"He won't do anything now, Dr. Lewis," said Kinsey. "Besides, we have no evidence—his weapon's down the chute. I'm not going to accuse him—"

Ivington looked up at her. "Were you the one—?"

"No. You must've talked to the boss. I got them out, but I didn't make any deals—didn't want to."

"But—" Marilyn shook her head, suddenly feeling completely helpless again. "Kinsey, don't you see? We can't let—*you* can't let things happen like this. Stolen embryos—they weren't meant to be people anyway. That's not your sister's child, not really—"

Kinsey's eyes flashed. "Dammit, Dr. Lewis! What good is your scientific training if you can't recognize a fact when you see it? 'Meant to be people'—that baby is a baby: you saw the picture. He cries, he nurses, he dirties his diaper, and his damn genome is as normal as anyone's! And how do you define 'your child'? Ann carried that embryo all the way to term; she's been pregnant with that child, she's nursing that child, she will care for that child until he's grown. If adoption makes a parent-child relationship, doesn't transplant?"

"But biologically—"

"Biologically be damned! People have adopted children for centuries, and considered the child theirs. We aren't just biology, Dr. Lewis. We're biology *plus*, and when you deny that you're denying facts. It's not sentiment, it's not silly emotionalism, it's a fact: genetic heritage is not the whole story. Besides, that's your argument against Dr. Murry. These embryos are biologically human, one hundred percent; it's only legally that they're not." She looked down at Ivington. "I'm sorry—I wish I could bring you yours, too. But—"

"I still want to know who blackmailed you, Kinsey. And why."

"Dr. Jennicott." Kinsey waited for Marilyn's reaction, and seemed to enjoy it. "Yes, Jennicott. Acting director, and all that. I didn't know he'd bugged the staff lounge—that's where I did the transfer. Apparently he heard one of the first tries, and kept a tape on it. Then on the third, he was waiting when we came out."

"And threatened you."

"Yes. He had plans of his own, and a source of embryos fit in." Kinsey stopped and turned as a knock came on the door. Marilyn nodded, and she stepped over and opened it. Tony Baker stood outside, looking grim.

"Marilyn? I need to talk to you."

"Me too." She started to get up, but Tony seemed to realize that something

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had been happening, and he came in quickly.

"Trouble?"

"Of a sort."

"I think I know part of it. Miss Kinsey—and who is this?"

"Dale Ivington," said Marilyn neutrally. "He made an appointment to see me."

"I see." Tony pulled a card from his pocket, looked, and nodded. "Well, under the circumstances, nothing I would say would be new to anyone in this room but you, Marilyn. And, if you've been talking to Kinsey and Ivington together, maybe not even that." As always, it seemed Tony took control of any group of people. Kinsey had settled on the corner of Marilyn's desk, facing him; Ivington had turned his chair partway around.

"The police just arrested Alan Jennicott for the murder of your graduate student, Dunkett." He waited a moment, then went on. "Apparently Dunkett called him that night, concerned about the shortage you'd mentioned, and he told Dunkett to meet him in his office. He wasn't on the Security sheets, but the man who was on duty remembers that he came in with a plausible excuse, and was here less than five minutes. It was stupid of him to kill Dunkett; he claims Dunkett was trying to blackmail him, but I suspect he just panicked. The police found connections elsewhere, too. He had a contact in Praed's lab—and that tissue was going to an organ-clone scheme in Idaho. Praed, apparently, doesn't have any strains suitable for transplant. He admitted to arranging five transplants from your lab, Marilyn, but we suspect more; all those have already delivered healthy infants, and I'm sure some are in the pipeline. He did mention Mr. Ivington here, when he was still trying to put the blame on Kinsey."

"What?" Kinsey's ears turned red.

"Oh, yes. Clever Alan—he claimed he'd found out about the transplants, and was planning to confront Kinsey this evening when she brought the Ivingtons' embryo out. Had it all laid out, a careful plan—he had to do something, after he found out about the protein sensors. After all, I might have been getting those reports all along, for all he knew."

Marilyn shifted in her chair. "I simply can't imagine Jennicott—I don't like him, but—"

"Marilyn, he's not like us. You told me once he was a poor excuse for a scientist—and that's right. He's an administrator, a second-rate thinker, and a damn bad plotter; I'd have set my ring up so it couldn't be broken."

"But what about—" Her gesture encompassed Dale Ivington and Kinsey both.

Tony's smile was grim. "Kinsey's on the spot. Jennicott has already implicated her, and it's clear he'll try to make it all her idea. I doubt that myself. Was it, Miss Kinsey?"

"No—I told Dr. Lewis. The first one—that was my sister. I did it for her, and he found it out, and threatened to have her aborted."

Tony nodded. "I suspected something like that. But how are we going to prove it? Mr. Ivington, could you identify the person you contacted?"

He shook his head. "It was all over the phone. My wife's cousin, when her

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pregnancy got going, she told my wife. It was a doctor—my wife went to see him. He started her on the hormones, and then I got a phone call. How much it would be, where to take the money, and that. I never saw any of them, but I do know where the doctor's office is."

"So do the police; Jennicott told them that." Tony sighed. "And your wife—does she know yet?"

"That there's no—yes." He looked down, and his shoulders shook. Marilyn stared fixedly at the desk top.

"But so far all you've done is pay money and see a doctor—you haven't broken any laws. You're in the clear, Mr. Ivington." He sighed again. "You know, Dr. Lewis, there's been very lax supervision in this department since I got sick."

Marilyn looked up, startled, to meet Tony's dark gaze.

"We have a lot of tightening up to do. You're losing a good assistant, I assume—it might be natural for that assistant to . . . mmm . . . make a last error or so." Now he was looking at Kinsey. "I doubt we'll ever know *every*thing that went on in this past week—or past few months—certainly we must do what we can to preserve the Institute's reputation for fairness and caring."

"Do you mean—?" Marilyn began to guess what he might mean, but he interrupted.

"I mean that perhaps we haven't convinced the public that we understand and care about their problems, as well as our own research interests. Perhaps Mr. Ivington should go home and bring his wife for a short visit, to tour the facilities—"

"Tonight? Paula? But if we can't—I mean she—"

"I think she might be fascinated," said Tony. He rocked back and forth, staring now at the ceiling. "You know, risk is a funny thing. Some people turn pale, sweat, back down. Others—they enjoy it. Call her, anyway. Suggest it."

"Tony, no!" Marilyn slapped her desk. "It's not right! It's—"

His face sagged a little, settling into the stony determination she had seen turned on others but never on her. "Marilyn, you can't hide from this. Eventually all research has human implications; there's no way to be safe. The proof is that those embryos—*your* embryos—are not only one hundred percent human biologically, at least five of them are human in the full sense of the law. They are babies, Marilyn, with names and futures. Nobody knows what they'll grow into—unless someone transplanted a Columbia strain some years back—but there's every reason to believe they are perfectly normal human babies. It's illegal, yes—but what are you going to do? Kill Kinsey's sister's baby? And the others?"

"Of course not!" She felt tears stinging her eyes despite her anger, and hated herself for that. "I'm not a murderer! I—"

"They are traceable," Tony went on, his eyes distant. "Run a genetic check on all babies born in the past two months, say, and for the next six or seven—assuming all the recipients were in this metropolitan area. Then you could find them, I suppose. But then what?"

Marilyn shook her head, unable to speak. She glanced at Kinsey, and met

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a look of mingled anger and sympathy. For her? She couldn't believe that, but she had always liked Kinsey. She shook her head again.

"We aren't hunting babies," Tony went on, finally. "It's a fact: they're human. It's not as if someone had transplanted one of Ken's chimaeras. Then we might have to go looking. But these—no. So we let the ones in the pipeline alone, and we don't say a word about the ones already born. But that leaves Mr. Ivington."

"Who hasn't broken the law—yet." Kinsey's contribution was unexpected, her tone challenging.

"So you want me to approve of a last felony, is that it?" Marilyn was surprised that she sounded so calm, bringing it out in the open. Tony cocked his head, watching her.

"I want you to think beyond your next paper," he said quietly. "Beyond the feud with Ken Murry. You're a damn good researcher, Marilyn, but you won't go further until you face what your research means."

"I don't want to!" She had found her shoes under the desk, and now stood abruptly. "Mr. Ivington isn't the only one who hasn't broken the law yet: I haven't. I'm doing important work, and I want to do it and be left alone!" She saw the naked pain on Ivington's face, and turned away. She heard Tony's sigh.

"It's too late for that. You've already lost embryos. You aren't going to be let alone—none of us is."

"So I should go over to the other side, break the law, just because—" She stopped suddenly, overcome by a sense of helplessness. No one would really believe she hadn't been involved, not if Tony chose to tell it that way. As if he'd read her mind, he answered.

"I'm not blackmailing you, Marilyn. I know you haven't broken any laws, and God knows Mr. Ivington can testify to that, and so can Kinsey. As far as I know you haven't so much as broken an anti-litter ordinance in your whole life. But being perfect by the law isn't always enough. What the hell is your research for—any of our research for—if we can't see the pain around us?"

"I hated gross anatomy," she said. No one answered, and she turned to face them. "I hated it: this woman with a tumor growing all over her guts—"

"So did I," said Tony. "Mine was a withered up old guy with prostate cancer, and I couldn't get it up for two months. Every time I peed I worried about mine. So you and I headed for a nice clean lab, right?"

She had not expected that; she had expected an attack. She stared at him, seeing no condemnation on his face. He went on.

"But Marilyn, that was years ago. I still don't want to dissect cadavers, or work with terminal cancer patients. But I know we have to face the results of our work."

"I don't know—" Even to herself, that sounded weak. She glanced at Kinsey, who was frowning at the desk, making patterns with the tip of her finger on its polished surface. "I still—" She looked then at Ivington, who flushed.

"I—I wish you'd look at a picture of Paula," he said softly. "It—she's such a—a good person." Before she could answer, he'd pulled out his wallet, slipped a photograph across the desk.

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She leaned over, looking. It was a snapshot, a laughing young woman with sadness lurking in her eyes. She looked normal, healthy, sane. Marilyn looked up to meet the same sadness, and no more anger, in Ivington's face. She felt her eyes watering again.

"Damn!" She turned away, fumbling for the desk drawer and the box of tissues. They were silent while she blew her nose, dabbed at her eyes. She faced Ivington again. "She's lovely," she said. "And you passed all the tests?"

"All of them." He drew a long breath. "We proved we were infertile, sane, stable in our relationship, financially responsible—" Marilyn held up her hand to stop him. She felt tired and slightly sick. Gun and all, craziness and all, he was so damned *nice*. If he'd passed the tests . . . She looked at Tony, who met her gaze steadily.

"Dammit to hell," she said without emphasis. "All right."

Ivington looked at Marilyn, eyes wide. She saw Tony's slight nod, and managed a smile as she slid the phone across her desk.

"You won't know until the tests come back," said Kinsey, stripping off her gloves. "Sometimes it doesn't work—sometimes they abort, partway along."

"But you tried," said Paula. Tears filled her eyes, and she blinked. "You tried to help." She had been as lovely as her picture suggested, even tense and frightened as she had been. Not a drug addict, not a prostitute, not an undesirable who shouldn't have had children—Marilyn could hardly bear to look at her.

"And we saw it," said Dale Ivington, his voice hushed. They had both looked through the microscopes, seen the tiny embryos in their cultures.

"Them," said Kinsey. "You have a better chance with more than one, so I gave you several."

"And now, fellow criminals," said Tony Baker, when Paula was dressed again and in his office. "This is where it must end. Until the laws change, no more: you have both promised not to set any more friends on us—the arrest of your doctor and Jennicott should provide ample excuse. If you lose this baby—and I hope you don't—we can't give you another."

Tony waited until everyone but Marilyn had gone to return to his main concern.

"You know, we haven't solved any problems," he said then. "We've eliminated a very nasty blackmailer—that's always good—but we haven't solved anything. People like the Ivingtons still want babies. We still have thousands of perfectly viable embryos. The world still has too many hungry people, people who wouldn't be at all happy to have Columbia strain embryos growing up. An excellent lab technician is out of a job and in trouble."

"I wish we hadn't done it," said Marilyn. Now that it was over, all her resistance had returned. She didn't wish the Ivingtons any more grief, but it was unscientific, somehow. "I still think—"

"You're a pure researcher, that's your limitation. Do you really think

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those babies won't grow up happy and healthy?"

"They should—biologically speaking. but if they do, then—"

"Then every embryo you dump is the same as dumping a baby. Right. Face that. If we can't face that, we shouldn't be doing the research in the first place. The whole natural world is like that—thousands dying, a few living—"

"But not on purpose, not—not *knowing*—"

"We don't know that." Tony stretched, and headed for the door. "We don't know that at all, Dr. Lewis. Maybe it *is* on purpose—did you ever think of that? No, I'm not advocating genocide or supermen: of course not. But honesty, yes. The same honesty that's served science from its beginning. We have to know what we're doing, and admit what we're doing, or we don't know what it means. Besides, one of the things that keeps me in science is sheer blind curiosity about what I don't know."

Marilyn shook her head, defeated but not convinced. "Well, what's going to to salvage my project: all those transfers."

"You're the one who argued so long. If you don't watch it, you'll get as rigid as Ken about his chimaeras. It's too bad he had that early success with the protohoms. He's so damned convinced that he knows the only right way to set up a human disease system, and it's so obvious to everyone else that it's not—"

"Even after this?" Marilyn's gesture encompassed the whole miserable situation. Tony nodded.

"Yeah. They really shouldn't have outlawed the protohoms, I didn't think, but the chimaeras cost too much, are too unstable. Your work is really solving problems—like that thalessemia thing—"

"—and creating problems."

Tony shrugged. Marilyn wondered if she'd ever have his attitude toward trouble. "The worst of the problems you create is that you don't see them coming. Learn to do that, Marilyn, and you'll never have to sit through another meeting listening to an Admin type like Jennicott: you'll be my successor." He flipped the light switch and waited until she came through the door before waving goodnight. Marilyn stared at his retreating back. Director? She'd never thought of that. It kept intruding the rest of the night, as she transferred embryos and made the delicate adjustments that kept them from being viable in someone's womb.

● Pedantry is the overrating (of) any kind of knowledge we pretend to. And if that kind of knowledge be a trifle in itself, the pedantry is the greater.

Jonathan Swift

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on gaming

Matthew J. Costello

In 1984 a film was released called *Buckaroo Banzai—Across the Eighth Dimension*. Briefly put (and here I am really stretching my ability to capsulize), the film told the story of Buckaroo Banzai, rock musician, master surgeon, scientist, and head of Team Banzai—a high tech commune devoted to creativity and defending the free world.

Now Mindscape has released a game that is, quite unofficially, very much in the spirit of Buckaroo. It's called *Infiltrator* (Mindscape Inc., 3444 Dundee Road, Northbrook, Illinois 60062; $29.95). And if you don't mind getting blown out of the sky, it's quite an amusing game.

The player takes the role of Captain Johnny "Jimbo-Baby" McGibbits/aka The Infiltrator. He is, to be sure, the world's most talented and diversified attack copter pilot.

But that is only one aspect of McGibbits' life. "Jimbo-Baby" has written a definitive 47 volume treatise on the Dewey Decimal system and his Piano Concerto Number 2 has been extremely well received. He is, the rule book tell us, a "super-soldier, ace pilot, ballistics expert, engineer, neuro-surgeon, politician, movie actor, rock star, world-class motorcyclist, explorer, karate expert, and devil-may-care all around nice guy."

Unfortunately, only a few of these attributes will be utilized in Infiltrator. The government wants McGibbits to stop the Mad Leader by carrying out a variety of secret missions inside the M.L.'s secret base. They suppply McGibbits with a Gizmo DHX-1 attack hellicopter (from Wizbang Enterprises), a flight manual, a secret communication code, weapons, film (with a pre-paid processing mailer) and The McGibbits Guide to Ground Installation Infiltration (pocket edition).

So, no concertos or nerve transplants this time, just the simple destruction of the Mad Leader's evil schemes.

And frankly, that was about all I could handle.

The game starts by giving you your first mission, to land at the Mad Leader's base and take some photographs of the installation. You are then placed behind the controls of the Gizmo, as it revs up and you pull back on the controls to climb. You actually see your hands work the copter's controls as you begin to leave your home base.

You can then access a tactical map by hitting "T" on the keyboard, and you are given your Automatic Direction Finder setting (ADF), a three digit number which will help you pilot your Gizmo to Chez Mad Leader. The number is then entered into the ADF, on the Communications Screen.

At this point, a plane usually flies overhead demanding that you identify yourself. This can be a bit tricky as you

(continued on page 186)

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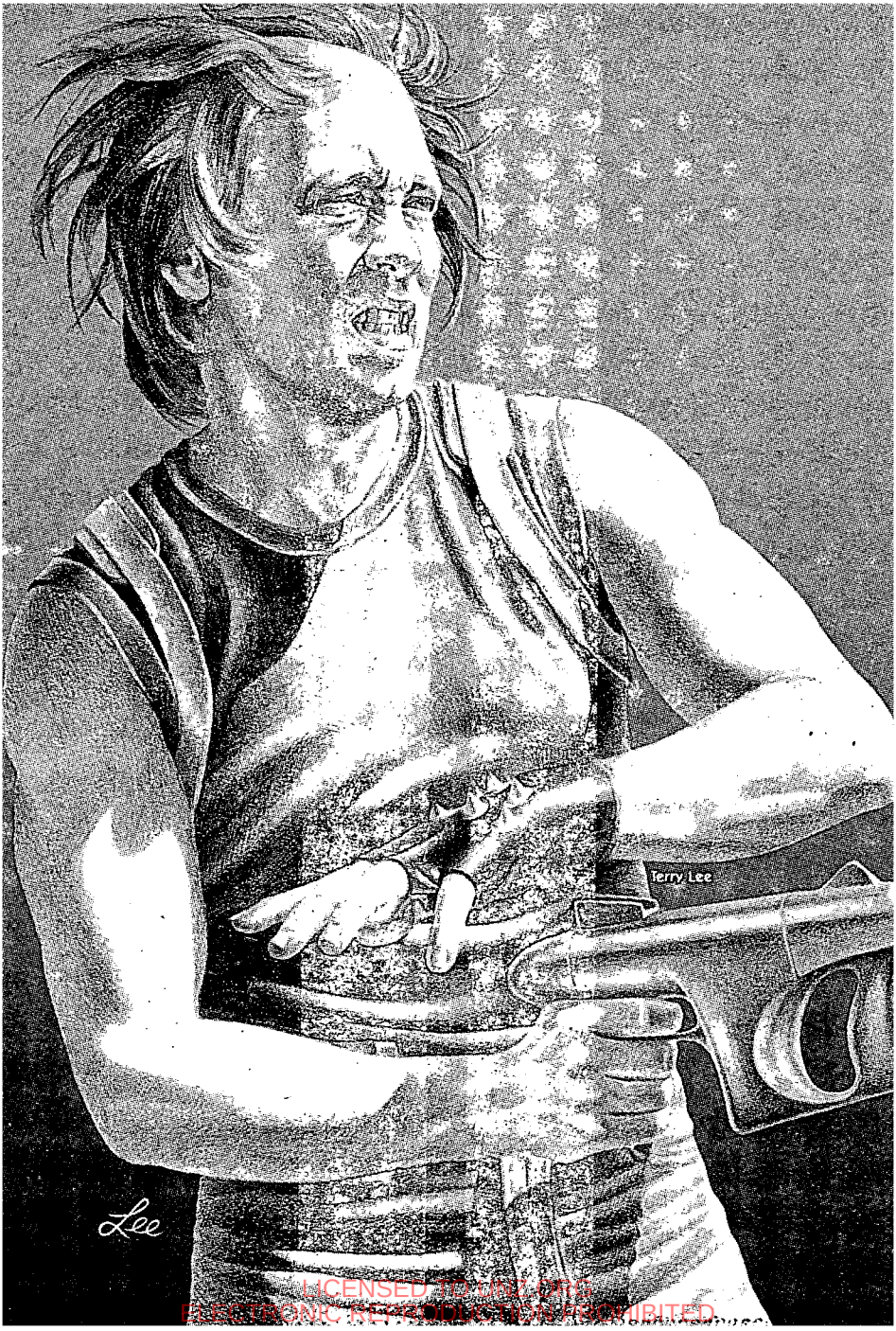

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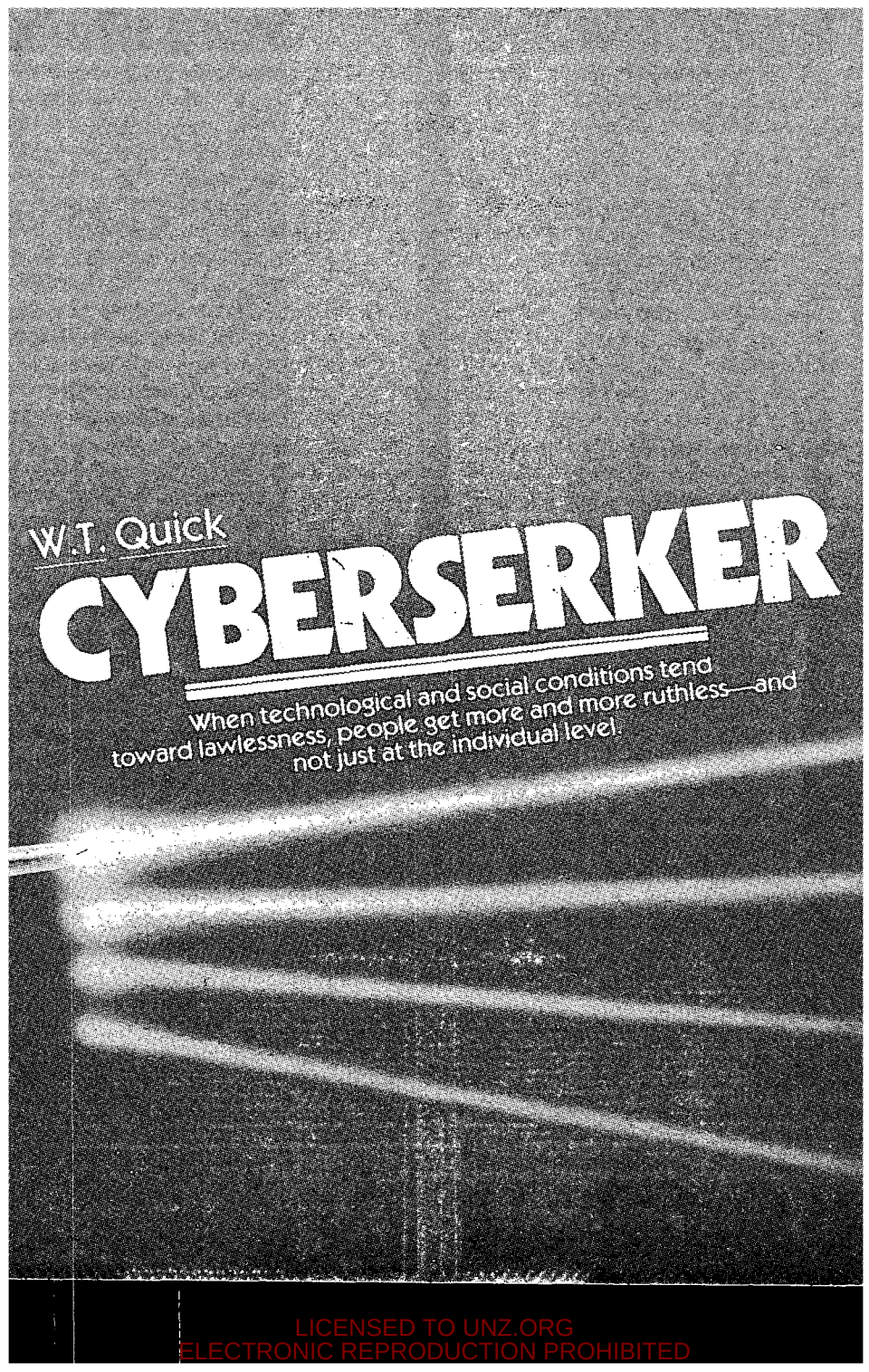
W.T. Quick
CYBERSERKER
When technological and social conditions tend toward lawlessness, people get more and more ruthless—and not just at the individual level.

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From the back, his head looked as if someone had carved a highway up the middle of it. Frizzy hunks of green hair billowed out on either side of the two-inch strip of shaved skin. Neon gang marks blinked crazily on the naked flesh. He wore a leather shirt the color of dried blood, stretched tight across wide shoulders. His black jeans were filthy and ripped, stuffed into the tops of scuffed biker boots. He was so big that people waited until he passed them by, then turned and stared at him.

He lumbered slowly up the street on Chicago's north side, smelling the smoke from rich people's fireplaces. Yellowed leaves crunched beneath his heels. He glanced down a side street, past the towering highrises just beginning to flicker and glow in the dusk, and saw the lake: chill, gray, and sullen. An armored Mercedes honked furiously as he stepped off the curb. He turned a flat, malarial stare on the car. The driver, his face pasty and frightened behind smoked glass, quickly took his hand from the horn button and flipped the automatic door locks.

Farther up the street, the flashing subliminals of the new BigBurger caught at his yellow eyes. He picked up his pace a bit, boots striking metal sparks from the concrete. He smiled, an aimless showing of rotten teeth and inflamed gums that people watched uneasily, then detoured around.

As he crossed from the sidewalk to the antiseptic pavement of the brilliantly lit BigBurger, he heard a faint click. He adjusted his backpack, grunted at the weight of it, flashed that hallucinatory grin at nothing in particular, and slogged on.

* * *

Eddie Lange scratched idly at the small pot belly that overhung his belt as he watched the screen. Around him other monitors showed different views of the BigBurger. Telltales glowed red, blue, and green. The air he breathed tasted cool and filtered. It was very quiet in the control cubicle. The light over the central monitor pulsed bright crimson, chopping his angular face into bizarre patterns of line and shadow. He clicked his tongue against his teeth as he read the information scrolling down the side of the screen.

The incredible street warrior trudging up the driveway toward the front door of the BigBurger was loaded for bear. The question was, did he intend to *use* any of that load, or was he just coming in for a hamburger? Carrying lethal weapons in twenty-first century Chicago might technically be a crime, but it wasn't anything out of the ordinary.

Twenty years of walking a beat cop's bloody pavements had pounded some terrible lessons into Eddie Lange, but a kind of naive cynicism remained. It said that anybody could be trouble, that guys like this usually *were* trouble, but maybe not now . . . not here, not on my beat.

He watched the screen and decided to try for a retinal close-up when the guy hit the front door. If this hulking street ninja was blasted out of his skull, it was probably a stickup. Or worse—

He sighed. In Detroit, only a week before, two Shabazz Night fanatics had taken over an old-style BigBurger and held forty people hostage for ten million bucks. By the time Company security had managed to root them out, thirty of

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the hostages were fried meat. One of the crazies had brought along a flame thrower.

It offended his cop instincts, and reminding himself that he was no longer a cop was an everyday ritual. Not a real cop, at least—he was a BigBurger cop, protecting a BigBurger, and sometimes he felt as much like a clown as the giant plastic symbol of the chain which dominated the area in front of the building. But it was a good job, good pay, and nobody even hinted that his nerve might be gone. One of the lessons he had learned was that you took what you could get, and didn't ask too many questions.

Without thinking about it, he pressed two buttons on the console in front of him.

"Gotcha," he muttered. He stared at the enlarged picture of the street warrior's eyes. The readout was fast. No evidence of drug use. He felt his spine begin to relax.

A little knot of tension remained, though; had been there since that night on the south side when he'd started the long ride down to the end of his career as a real police officer. Sometimes, in the cold hours before dawn, he pondered it, sucking Budweiser and numbering the many tiny erosions of will that had added up to that night. Three years was a long time, though, and almost anything grew scabs if you waited. He hardly thought about it any more, except maybe just a little, when the buried computer clicked as it scanned a rag-tag monster like the one entering his very own BigBurger.

He considered the knockout gas, the electroshock traps, the strobe disorienters, the sonic sprays, ticked off all the other nasty gadgets built into the innocuous building, and breathed softly. A cop was always scared. It came with the territory. Once upon a time he took guys like this barehanded. He liked to tell himself he still could. But the faint trembling in his fingers said he didn't really want to try.

The big guy stepped across the threshold. He paused there, his sickly-yellow eyes sliding back and forth. The readouts said he was carrying some kind of automatic weapon in the backpack; other stuff, too—unidentifiable, but no doubt deadly. Eddie's hands crept to the weapons control panel and hovered there, clawlike. "Yeah, guy," he said. "Just try."

But part of him remembered the knife sliding between his ribs, and another part of him chuckled sourly.

His name was Slum. Once there had been another name, but he barely remembered it. Something normal, like Richard, maybe. But that was a long time gone, hidden behind a twisting fog of drugs and bone-shattering violence. That was then, and now he was Slum, and the men who had bought him with money and drugs—*they* were his current concern. He stood just inside the door, smelling the odor of burning meat and greasy fries, his tarnished chrome eyes squinted againt the bright fluorescent dazzle.

The spot underneath his right ear itched. The men had paid for that, too. In a shadowed way he understood what a valuable thing the carbon implant was. On his own, he could never have afforded the surgery or the hardware. Now

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it was done, and they couldn't take it away from him. Once he was finished here he wouldn't have to be a street bum anymore.

His cracked teeth flickered at the thought of it. The terrified young girl behind the counter shuddered at the sight of those teeth. It wasn't a good neighborhood. She'd seen a lot. But Slum was something special. Definitely.

Thank God for Mr. Lange upstairs in the control cubicle.

"Can I help you, sir?" she said. Her soft voice quivered faintly. Her name was Debbie, and she was putting what she made at the BigBurger away for college.

"Yeah," Slum said. His eyes slid over her like hot mud. He smiled at her again and she looked away quickly. Two spots of red appeared on her cheeks. His stare kept her pinioned as he reached into his filthy jeans, pulled out the fletch of microsoft, and—

"Oh, shit," Eddie muttered, his fingers straining above the control panel as the big streetfighter slipped the fletch into the carbon socket just below his right ear. Eddie had run across some stuff about those fletches in his Company training. Whole bodies of information could be imprinted in their microstructure, then accessed by the human brain via the socket and its hardware. Instant knowledge. The cutting edge of technology, his trainers told him, but Eddie was of the old school. Somebody sticking something into his ear didn't immediately register as a hostile act. Besides, they said tech like that was completely beyond the reach of street terrorists. Obviously, they were wrong.

What was going on here?

And so, in one instant of confusion, Eddie made a mistake. It wasn't what he did, but what he didn't do. Two things. He didn't immediately use every bit of his defensive weaponry on the huge invader, nor did he hit the Central backup call for help. Five seconds later, it was too late.

Slum's scarred face took on all the expression of a ceramic pot. He pivoted, one hand in his backpack, then out, rising. Eddie slammed at the shield controls, which were supposed to drop a shatterproof section of blast-plastic between the customer area and the rest of the BigBurger. He couldn't make out what Slum tossed across the counter before the blass shield fell. Slum's fluid motion continued as he drew an M-29 Magnum Machine Pistol from his knapsack and blew out the front windows of the building.

Eddie backhanded the rack of retchgas switches. *Debbie was down there!*

The shatterbomb exploded behind the blass shield. The barrier shivered into a patchwork of tiny snowflaked veins, but held. Eddie felt the sudden thud through the armored walls of his cubicle. He didn't want to think about what was left behind the counter.

"Where are you, asshole?" he screamed at the screen. The building was filled with yellow clouds of gas. He couldn't see the intruder.

The building shuddered heavily and the lights went out.

He got the transformer, Eddie thought. He heard a rising whine as the emergency generator kicked in and the lights

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came back on. Even in the cubicle, he could smell scorched metal. He glanced at the digital clock on the wall. Only five seconds had passed since the first move. Eddie punched an emergency call onto his keyboard. The screen responded instantly.

"UNABLE TO COMPLETE," the screen said.

"Shit!" He tried again, but knew it wouldn't do any good. The damn thing either worked, or it didn't. He pounded his knee in frustration as he watched the mustard-colored gas dissipate, blowing through the wreckage of the front windows. It was silent in the restaurant, except for the occasional tinkle of falling glass. Debbie must have had her noseplugs in, like a good girl, or he would have heard her vomiting. There was another alternative, of course, but he ignored it.

He stared at the screen. He was cut off from Central. They automatically monitored him every half-hour, but the next check was twenty-five minutes away. City cops wouldn't come onto contracted private property, even if he could reach them. He was alone. And the audios were picking up the slow, heavy sound of footsteps.

It was going to be a long twenty-five minutes.

By 1996, less than one percent of private residential crime was ever listed as solved. The figures for commercial crime were only slightly better. In the cities, police forces were slowly sinking beneath the lavalike onrush of random, senseless violence. It was estimated that in Chicago alone, a fast food restaurant was robbed every six point two minutes. Almost none of the stickup artists were ever apprehended. In certain circles, they called BigBurgers "people's banks."

Business will suffer almost anything but a threat to its profit. The era of private security began. Companies were formed. Insurance monoliths created subsidiaries which rented protection to their clients. For a few pennies a day, you could call your insurance company if your home was robbed. Since these corporations were paid for results, they did a better job than the public agencies. Just as, years before, International Parcel Service proved they could get your package from New York to San Francisco in half the time for half the price, companies like Homeguard and All-Sentry, allowed by statute to access the files of the FBI and other government anti-crime organizations, began, for the first time in decades, to put a dent in the activities of the small criminal.

The giant companies, with great exposure and high risks, sometimes found it easier to fund their own security. BigBurger, with eleven thousand outlets in the United States alone, was one of the first to experiment with on-site deterrent technology. Of course, technology by its very nature tends to permeate society. What the companies used was also available to the criminals.

There were confrontations.

It was a very strange feeling. Slum tried to think what it was like. Finally he had it, or something close. There were times when, deep into a muta-acid high, he felt as if his mind had split, as if he were thinking about his thought processes while they whirred in front of

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him. Mental mirrors. Memories that were not *his* memories percolated in his brain. The blueprints of a standard BigBurger? Right there, glowing behind his eyes in shades of electric blue. Location and armor of the main transformer? That, too. He'd never even known BigBurgers *had* a main transformer.

All the goodies, everything—imprinted on the small, feathery bit of flex-crystal jammed in a carbon hole beneath his right ear. For a moment Slum paused, dazzled at what life could be if he had one of the black fletches; Sammy Wing's "Crime and Technology," for instance. That one cost a fortune. But he would have a fortune when he finished here.

A stinking wind off the lake sliced at his face and he smelled smoke. He looked up at the building. He knew where the control cubicle was, high up in the back corner, hidden behind a featureless wall. There was a man inside the cubicle, like a tiny pearl inside an armored oyster. All he had to do was pry the man out of there. His bosses wanted to see if it could be done. Slum wasn't the brightest joey on the street, but he could figure it out. He understood why those shadowy, powerful men hadn't used one of their own for this task. Slum was good, but he was also expendable. And there was no connection. In the age of hi-tech, that was what those men feared the most . . . the connections.

Slum was almost whistling when he climbed back over the shattered fringe of glass and the electric charge picked him up and dropkicked him through the window like the boot of God come down at last.

He couldn't get the cameras to swivel enough to focus on the spot underneath the counter where Debbie's body ought to be. At least, he couldn't see her anywhere else.

The shatterbomb had made a mess of the back counter area. Most of the automated cooking equipment was a twisted, smoking shambles. Maybe she had been lucky. She was young, her reflexes were quick. And maybe she hadn't been; maybe there was nothing under the counter but a pile of tattered, bloody rags. He couldn't see any blood, though.

Then he heard it, or thought he did. A faint moan.

He flipped on the loudspeaker. "Debbie?"

Again, very faintly, a sound.

"Debbie? Are you okay, honey?"

"Mr. Lange?" Her voice was high and thin, stretched tight with pain.

"Honey, don't move. Don't try to move. Where are you?"

A long moment of silence. Finally, "Under the counter . . . I think. Mr. Lange—I can't feel my legs. What—?" Her voice trailed off.

"It's okay, Debbie. You stay right there. Help is on the way. I'll get to you myself, just as soon as I can."

It was probably a spinal injury. His stomach clenched at the enormous injustice of it. Debbie was barely sixteen, all her life in front of her, and that slime—

He glanced at the outside pickup screens. Slum was still lying flat on his back on the concrete walk in front of

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the building. It looked safe enough, but the machine pistol was in his hand. He could be shamming, and Eddie had no way of telling. The electrics were not designed to be lethal, and the street monster was *big*.

Am I a coward? Eddie wondered suddenly.

He knew it was a stupid thing to be thinking right then, but for an instant the same old scene replayed itself against the back of his eyeballs.

Chicago hot summer night, sky the color of radio static, streetlights sizzling and popping overhead. Shadows like scalpel wounds. The black hole of the alley in the middle of the ruined block smelled like an open sewer.

His partner, Frank, climbed warily out of the squad. His shoulders were taut. He nodded at the darkness. "You're going to have to back me up, Eddie. I think they went down there."

It had been a mom-and-pop, ripped by two punks with shotguns. The old lady lying on the floor in a pool of blood, her husband weeping silently. "Why?" the old man had asked.

Eddie climbed out slowly, his heart pounding. They were down there, all right, and it was a death trap.

"We need a backup, Frank."

His partner bared his teeth in disgust. "Sure. Call for it. But you know, and I know, that these punks will be long gone down some rathole by the time the tac squad gets here. Come on, Eddie, this is what they pay us for."

Eddie pulled the riot gun from its rack. "Yeah, right," he said. "Let's do it."

He saw the shadow twitch before Frank did, but the riot gun wasn't aimed. His reflexes took over, and he ducked behind the corner of the building.

"*Eddie!*"

The shotgun bloomed like a malignant rose.

Ratlike movements.

Eddie remembered trying to bring the riot gun up, but slowly . . . so slowly. And another shadow came around the corner and stuck a knife in his ribs. It didn't even hurt.

Frank didn't hurt, either. He was dead.

And all that Eddie could think about later was that he hadn't really wanted to follow Frank down that alley.

"Mr. Lange—"

"It's all right, Debbie. I'm getting there."

So why *wasn't* he getting there? The girl was down there, alive but probably badly injured, and the street warrior was flat on his back, helpless. All he had to do was flip the mag locks on his cozy hidey-hole, extend the ladder and climb down it, go kick Slum in the head a couple of times to make sure, and then get to work on Debbie with the first aid kit. Simple . . .

He sucked in his gut, turned the speakers up a notch. "Okay, Debbie, I'm coming out now. Just hang on, I'll be with you in a second."

He checked his boot, then undogged the locks. He had the optics focused as tightly as he could get them on Slum's face. Nothing showed, not a quiver.

Now or never, he thought.

He cracked the door and looked out.

Without the aid of the monitor, he couldn't see the street joey any more. The fractured glass curtain hung like a

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wave of crystalline ash, obscuring his vision. His lips jerked slightly as he climbed slowly down the ladder.

"Debbie?" he whispered. "Where are you, baby?"

His boots crunched softly on a fine powder of blass dust. He still couldn't see her. The shatterbomb had made high-tech spaghetti of the interior of the room. Naked wiring and chunks of insulation and melted foam hemorrhaged from the walls, dripped from the ceiling. The place smelled like a swamp fire. Metal strained beyond tolerance groaned and cracked. He wondered how Debbie had survived.

If she survives, he reminded himself.

It felt as if someone had driven an electrified spike in beneath his right ear. The overhead lights flickered and blossomed through his gummy eyelids. Strange memories chittered and mumbled inside his skull.

Any remotely normal human would have congealed into a chunk of mental ice at what was happening inside Slum's head as the microsoft fletch, convulsed at the sudden burst of current from the BigBurger's protection system, discharged jagged sprays of random information directly into his thought processes. But Slum had fought methyldesoxyamphetamine to a draw, had forgotten how much acid he had done, had lived in a marijuana fog for years. It was only a trip. He knew what to do about trips.

He forced the deep breaths, waiting until his heartbeat slowed. Then he reached up and pulled the fletch from its carbon socket.

Like turning out a light. The world came back, and for a moment he couldn't remember why he was there. His own memory held the explosions, the shatterblast, the electric shock, but he couldn't remember *why*.

But the men had planned for that, too. He pulled the backup fletch from his jeans and slid it softly home. Then he tightened his grip on the machine pistol and slowly hauled himself upright.

His grin would have turned flesh to frozen iron.

Eddie saw the monstrous shadow rising on the crystal curtain of shattered blass.

"Come *on*, Debbie," he mumbled softly. Her body was dead weight. She had passed out when he pulled her out from under the wreckage of the counter. There wasn't much blood, just a few scratches. He couldn't tell how badly she was hurt. But she couldn't move her legs. He didn't know if it was the right thing to do, moving her like that, but sooner or later he was going to have to go out and check on Slum. He didn't want her exposed if he didn't come back from that, and the only relatively safe place he could think of was inside the monitor cubicle.

Now he wouldn't have to go after Slum. It looked as if the street predator was coming after him instead.

Panting, he dragged Debbie the rest of the way into the cubicle and arranged her in his chair. He set it on full recline, and hoped it would be enough. It was hard to watch the monitors from his position, hard to reach some of the controls. Debbie's breathing was ragged. Carefully, he pried open one of her eyelids. Concussion, probably.

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The readouts on the screen said he had ten minutes before the automatic monitoring system would discover that something had gone very wrong with his BigBurger. He doubted, however, that he had ten minutes.

He made sure the magnetic door locks were activated. Then he paused, conscious of the sound of his own breathing, of the heavy pounding of blood in his ears. On the screen, Slum's shadow was outlined on the blass, a black blob, unmoving.

He was coming on again. Eddie shook his head. It made no sense. A street punk with the latest in cybertech gear, with modern weapons, and a seeming compulsion to attack this BigBurger. With that kind of stuff he surely didn't need what little money was in the till. Anyway, it was his for the taking. Eddie sure as hell didn't have any intention of trying to stop him. All he wanted this guy to do was *leave*.

Best to make sure, though. He reached across Debbie's body and thumbed the speaker switch.

"You out there," he said. "Take the money. It's Company money. I don't care, just take it and get the hell out of here."

The shadow moved, and a sound like a demented typewriter filled the restaurant. Slum began to methodically shred the blass curtain with high energy slugs.

He wasn't after the money.

Eddie punched up the specs on the blass screen. They confirmed what he vaguely remembered. The screen was a reinforced polymer made by Mitsubishi, formed around a mesh core of monomolecular wire, which the same company grew at one of its orbital factories. The wire was unbreakable, but it was dangerous, nonetheless. Eddie wondered if the street monster knew just *how* dangerous.

Debbie made a small, moaning sound. He reached over and touched her gently. "It's okay, honey," he soothed. He tried to make it sound like he believed it.

The attacker ended his fusillade. Eddie watched him on the monitor. Slum set down his knapsack and opened it. Then he reached in and took out a small bundle of transparent material. Carefully, he unfolded it into a pair of bootcovers and a pair of gloves. Eddie had no doubt at all that the material provided insulation against the BigBurger's electrical protection systems. Then Slum pushed nose plugs into his nostrils.

So much for the retch gas, Eddie thought.

He didn't understand it. Why was this street thug, equipped like a Skyforce assault trooper, making war on his BigBurger?

The answer niggled carefully at the edges of his mind, but he couldn't quite catch it. Somebody was behind this monster, somebody big. But who? One of the gang leaders? They had the resources, for sure, but people like that didn't have anything to do with common trashers like this guy. And what was the gain? Really bad guys weren't into knocking over BigBurgers.

Somebody heavy, though . . . almost, then, he had it, but the giant figure down below reached again into his knapsack before re-hoisting it to his shoulder, pulled out a dark object about the size

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of a baseball, and tossed it toward the back of the store.

It was a shaped magnetic grenade. Eddie heard the dull clunk as it fastened itself onto the steel back wall. The resulting explosion blew out a hole the size of a truck where the auxiliary generator had been and, once again, the lights went out. Into the silence, punctuated by the pop and hiss of crumbling mortar, the terrorist laughed.

"I'm Slum, little man," he howled. "Come out from behind your wall. You're dead now." He made an eerie, mad sound. It was like scorched bones scraping together.

He paused a moment, his grotesque head cocked, then shrugged and stepped forward. Eddie watched him lift the monomole mesh carefully, with the barrel of his assault pistol. Then he was inside. He stared directly up at the wall behind which Eddie was hiding.

Probably knows exactly where I am, Eddie thought. His throat grew dry. The weak light filtering in from the outside made the interior of the ruined store a place of shadows, moving . . .

Slum pulled another shatterbomb from his knapsack. "Comin' for you now, man. Gonna blow you right out of there." He hefted the grenade as if it were some kind of deadly fruit.

The thought came softly to him then, with sadness, but with utter finality as well—*I've got to go out there and face him.*

I can't let him come here, he realized. Debbie will die, too. If he gets me out there, maybe she has a chance. Maybe.

He thought he felt the ghost of a cop dying in a dark alley nod agreement.

His hands shook as he made an adjustment on the control board. He hoped enough juice remained in the last-chance batteries to operate the equipment. Slowly, he let the maglocks unlatch. Their sudden click made a sharp sound in the twilight. Slum froze. Then he laughed.

"Yeah, come on out, man," he cackled. "Let's party!"

Eddie slipped the Russian commando knife from his boot. He'd taken it from a dope-crushed vet in a street fight years before, and when he'd figured out what it could do, he'd kept it. Right now he wished he had a gun, but, as added security for the store, most of the systems would freeze in locked position if a gun was scanned in the cubicle. All that electronic BigBurger stuff was supposed to protect him. So much spit, now. He took a deep breath, his boot-heel against the armored door. Then he let out the breath, and—

—was rolling down the short flight of stairs. Shoulder crunched against one corner. Pain. Hit bottom; still rolling. Time slowed down. The chatter of the machine pistol rattled above the roaring in his ears.

He saw Slum in a half-crouch, framed against the backdrop of the shattered front of the restaurant.

Dumb, he thought mildly, and launched himself. Maybe he won't see me in time. But when the slug caught him in the right thigh and spun him around, he realized that vision didn't matter, the way Slum was spraying firepower around. . .

The firing shut down. Into the sudden hush, Slum chuckled. Eddie continued to drag himself forward, the knife in his

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right hand. Slum watched him, a fractured grin on his face.

"Too late, man," Slum said. "Too little and way too late."

Eddie counted it down under his breath.

Slum raised the pistol.

And the sonic disruptors, set on timed delay, went off like all the burned souls of hell screaming at once.

Slum froze. The disruptors, at close range, induced paralysis. Eddie felt himself going numb. He gritted his teeth and concentrated on the pain in his leg. Finally he was close enough. He pressed the button in the handle of the Russian knife, and its specially designed blade, five inches long, shot from the handle and caught Slum in the throat.

The disruptors, eating power like unbottled demons, coughed once and died. Slowly, the huge street monster, his eyes bulging, clutched at the naked blade in the throat.

With one final, agonizing effort, Eddie shook off the paralysis and lunged forward. He screamed as he slammed into Slum's belly. Slum toppled backwards into the mesh screen as Eddie collapsed at his feet.

Monomolecular wire is exactly what it says it is, an incredibly long single molecule. It is thinner than the sharpest knife edge.

Eddie finally pulled himself up and looked over the toes of Slum's boots. The boots were on his side of the mesh. What was on the other side was no longer recognizable as anything human.

Eddie threw up.

After a time he looked at his watch. In four minutes, the BigBurger cops would get an emergency alarm. He found that he was able to stand. Must be a flesh wound, he thought. Lots of flesh there. A dizzy tide washed over him. He steadied himself and stared at the monstrosity on the other side of the mesh and thought. Criminals wouldn't send that guy in. There was only one group interested enough, and ruthless enough, to want to know exactly how good the defenses of a BigBurger were.

Testing to destruction, they called it. A corporate sort of phrase.

Carefully, he moved around to the other side of the screen. He stood there until a horde of Company security people erupted from every point on the compass. Almost like they'd been waiting.

Wrapped in the soft shrouds of the unconscious, a dead cop finally went to rest. He took a small, hard knot of fear with him.

The commando knife was a comforting weight in Eddie's sleeve.

The boss should get here soon, he thought. . . . ■

● There are two ways to slide easily through life: to believe everything or to doubt everything; both ways save us from thinking.

Alfred Korzybski

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The Alternate View

ARTIFICIAL GRAVITY: WHICH WAY IS UP?

John G. Cramer

The space station doughnut of *2001* and the O'Neill space habitat cylinder have become part of the furniture of science fiction, so much so that we take spin-generated artificial gravity to be interchangeable with the Earth-normal variety in which we live. But there are differences that would be quite apparent to anyone living in the spin-generated variety. The subject of this AV column is an exploration of the differences between the "natural" gravity of Earth and the "artificial" gravity of a rotating space station.

My interest in the physics of space station gravity developed because last year Vonda McIntyre was writing a book with a space station setting, and she asked my advice. The book, *Barbary*, is about a teenager who leaves Earth to live in a space station with spin-generated gravity. I helped Vonda in a very minor way by identifying the physical effects that the heroine would experience in that environment. What's it like to ride an elevator in a space station? How would a ball game look if it were played there? If you woke up in a strange location, what simple tests would tell if you were in a rotating space station rather than at rest on the ground? And so on . . . I found that there are some interesting side-effects of artificial gravity, perhaps well known to NASA experts but obscure to the rest of us. And I was surprised to find that some recent SF hasn't been too accurate in describing the space habitat environment.

Looking at the world from a rotating vantage point (be it a merry-go-round or a space station) is odd and confusing. So let's start with a simple concrete example. Suppose that we are on a doughnut space station, about half the size of the big one in *2001*, providing living and working space at earth-normal gravity (1-g) for about 150 people. Such a station might take the form of a "wheel" 15 m wide and 160 m in diameter, rotating on its axis so that it makes a full rotation every 18 seconds. Because the floor of the space station rotates through its full circumference in this time, it has a speed (called the *tangential velocity* because the velocity lies along the tangent of the circle of travel) of 27.9 m/s. A note here on scaling to other sizes: If the station had *4 times* this diameter, the rotation period to give 1-g of artificial gravity would be *twice* as long and the speed of the floor would be *twice* as large.

Let's do a simple "Mr. Science" experiment in this space station. Place a phonograph turntable on the floor and spin a cake pan filled with water. Let's use a cake pan 40 cm in diameter and spin it at the 78 RPM setting of the turntable. The outer edges of the spinning cake pan will be moving at a speed of 1.6 m/s with respect to the floor.

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Therefore, the edge of the cake pan toward one outside wall of the station is traveling at an absolute speed of $(27.9+1.6)=29.5$ m/s while the opposite edge of the pan has a speed of $(27.9-1.6)=26.3$ m/s. The pull of artificial gravity depends on the square of this tangential speed, so the "fast" edge experiences an increased pull of 1.12-g, while the pull on the "slow" edge decreases to 0.89-g. The water in the pan will tend to tilt, climbing higher on the slow edge and dropping lower on the fast edge. A spinning gyroscope would tumble in the same way, making the toy top a poor gift for a space child. And so we see different physical effects in the artificial gravity of a space station than would be found if the same experiments were performed in the "natural" gravity of Earth.

The simple experiment has an interesting implication for the psychophysiology of human balance. Our equilibrium and our perception of vertical orientation come from the interaction of the fluid in the semicircular canals of our inner ears with the nerve fibers there. The vertigo experienced during and after spinning in an amusement park ride demonstrates what happens when this mechanism is disturbed. Seasickness is another example. Now suppose that you stand looking spinward down the long upward-curving hall along the rim of the space station, and then rapidly turn your head clockwise so that you are looking at the side wall to your right. Your head has made a rotation similar to that of the pan on the turntable. The fluid in your semicircular canals will therefore rise on one side and drop on the other as the water did. The subjective consequence is that you will "see" the floor tilt to the left, with the right side wall "rising" and the left side wall "dropping" momentarily. The amount of perceived floor tilt depends on the ratio of ear velocity to floor velocity, but for any but the very largest of space stations the tilt sensation will be quite unmistakable. This effect is likely to be fairly disorienting and may be a source of nausea and vertigo for the "greenhorn" who has just arrived from "natural" gravity. For the experienced space station inhabitant, however, the "floor-tilt effect" will become a useful aid to orientation because it will allow the user to tell whether he is looking "spinward" (in the direction that the floor is moving due to the spin) or "antispinward" (against the floor velocity) down the hall.

Head twisting and nodding will also produce other subjective effects. Facing a wall at right angles to the spin direction and doing a similar head twist will make the floor seem to tilt up or down. Nodding or wobbling your head will produce similar effects. Placed in a small closed room, the experienced space station dweller can establish his orientation with respect to the spin of the station with a few twists of his head.

The memorable jogging scene of *2001* when astronaut Frank Poole runs in what we see as a vertical circle brings to mind another effect. The jogger running spinward down a hall along the rim of the station increases his tangential velocity, thereby creating a slight increase in the centrifugal pull he experiences and giving the impression of running uphill. Running antispinward will decrease the pull slightly and create

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the impression of running downhill. The change in pull will depend on the ratio of running speed to floor speed, and the effect would be less in a big station than a small one.

The mysterious "force" that makes the water tilt in the pan, moves the fluid in the semicircular canals, and changes the pull on the runner is called the *Coriolis force*. Like the "centrifugal force" which makes spin-generated artificial gravity, the Coriolis force is not a real force of nature, but rather a sort of illusion or pseudo-force which appears to observers in rotating systems. But if the Coriolis force is an illusion, its effects are nevertheless quite real. Its actions on air flow on the Earth's surface are responsible for the circular weather patterns visible in satellite weather pictures: the ragged spiral of the hurricane and the gentle swirl and counter-swirl of high and low pressure areas.

Another Coriolis effect appears when we ride the space station's elevator. There are good astronautical engineering reasons for arranging the station so that arriving shuttles dock at the station hub, matching velocity and spin with the station before establishing tight mechanical contact. Arriving passengers exit the shuttle in the zero-gravity zone of the hub and then ride an elevator to the 1-g zone at the rim where the living and working areas are located. But what is the elevator ride like? The elevator must travel 80 m from hub to rim, the rough equivalent of the elevator in a 25 story building. Let's assume that the elevator is set to accelerate to a speed of 5 m/s in a period of 2 seconds, then travel toward the rim at that speed for 14 seconds, and finally decelerate to

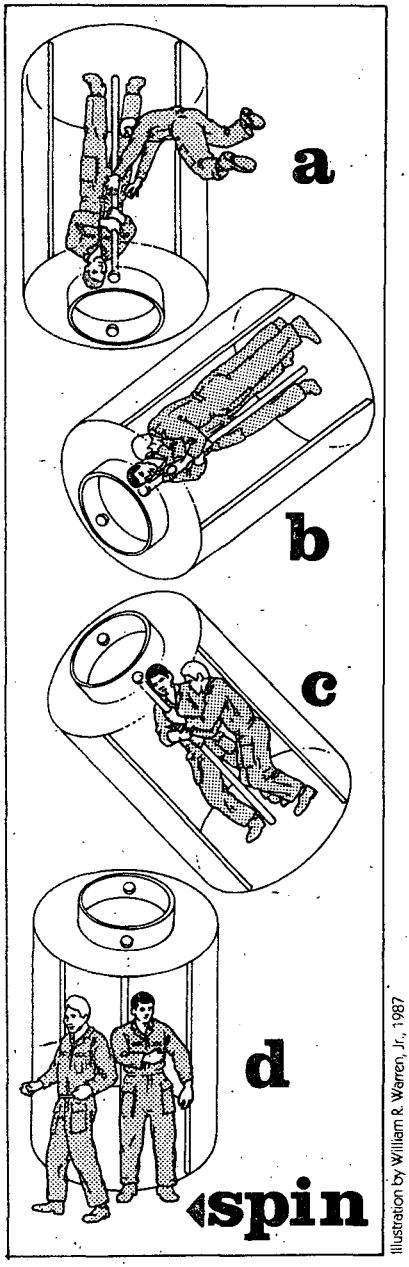

Illustration by William R. Warren, Jr., 1987

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zero velocity in the final 2 seconds of the trip.

With this arrangement, the elevator riders will be pushed against the ceiling of the car for 2 seconds, with a force of 0.25 g. During that 2 second period a pull toward the anti-spinward wall of the car will build up to a force of 0.22-g. During the 14 second ride this sideways force will remain constant, but added to it will be a downward force which builds up to 1-g as the centrifugal force of the station's spin builds. Finally in the last 2 seconds of the ride the downward force will rise to 1.25-g and the pull toward the anti-spinward wall will diminish to zero. As the car stops and the passengers step out the constant 1-g downward pull of the station is all that remains. And so the passengers have had a very peculiar ride. Their perception of "down-ness" has migrated from the ceiling to the anti-spinward wall and finally to the floor, as if the car had rotated 180° during the trip.

The source of the sideways pull in the elevator is the Coriolis force. An equivalent view is that the riders in the elevator must travel from the hub, where they have zero tangential velocity, to the rim, where they must match the 27.9 m/s tangential velocity of the floor. Clearly during the elevator ride they must not only be taken "down" along a radius from the hub to the rim, but they must also be accelerated up to the speed of their new environment. The sideways push of the elevator wall accomplishes this. A similar ride in the upward direction from rim to hub would reverse these forces, and now the sideways pull toward the spinward wall removes the rim's tangential speed to match the hub environment.

Finally, let's consider space station sports. How would a baseball pitch or a basketball pass be changed in the environment of the space station? The answer depends on the direction of travel of the ball. Movement parallel to the station's axis of rotation, across the long hallway for example, shows no Coriolis effects. But a ball thrown spinward will seem to drop, and an anti-spinward pitch will rise due to Coriolis effects. Similarly a falling object will curve anti-spinward, a rising object will curve spinward due to the Coriolis effects, as we saw in the case of the descending elevator. Athletes after sufficient practice will begin to view these distortions of trajectory as natural and will automatically include compensations for them as a part of optimum performance. However, the size of the compensations needed depends on the tangential velocity of the space station floor, with higher velocities leading to smaller Coriolis effects. In an Inter-Orbital Olympics where participants from a variety of stations of different sizes are assembled for athletic competition there will be a definite "home-court" advantage. Participants from smaller-diameter space stations will tend to overcorrect for the Coriolis effects and participants from larger diameter stations will undercorrect. I wonder how the Inter-Orbital Olympic Committee will handle that one? ■

REFERENCE

Spin Generated Gravity:
"An Overview of Artificial Gravity," R. W. Stone, Jr., NASA Report SP- 314 (1973).

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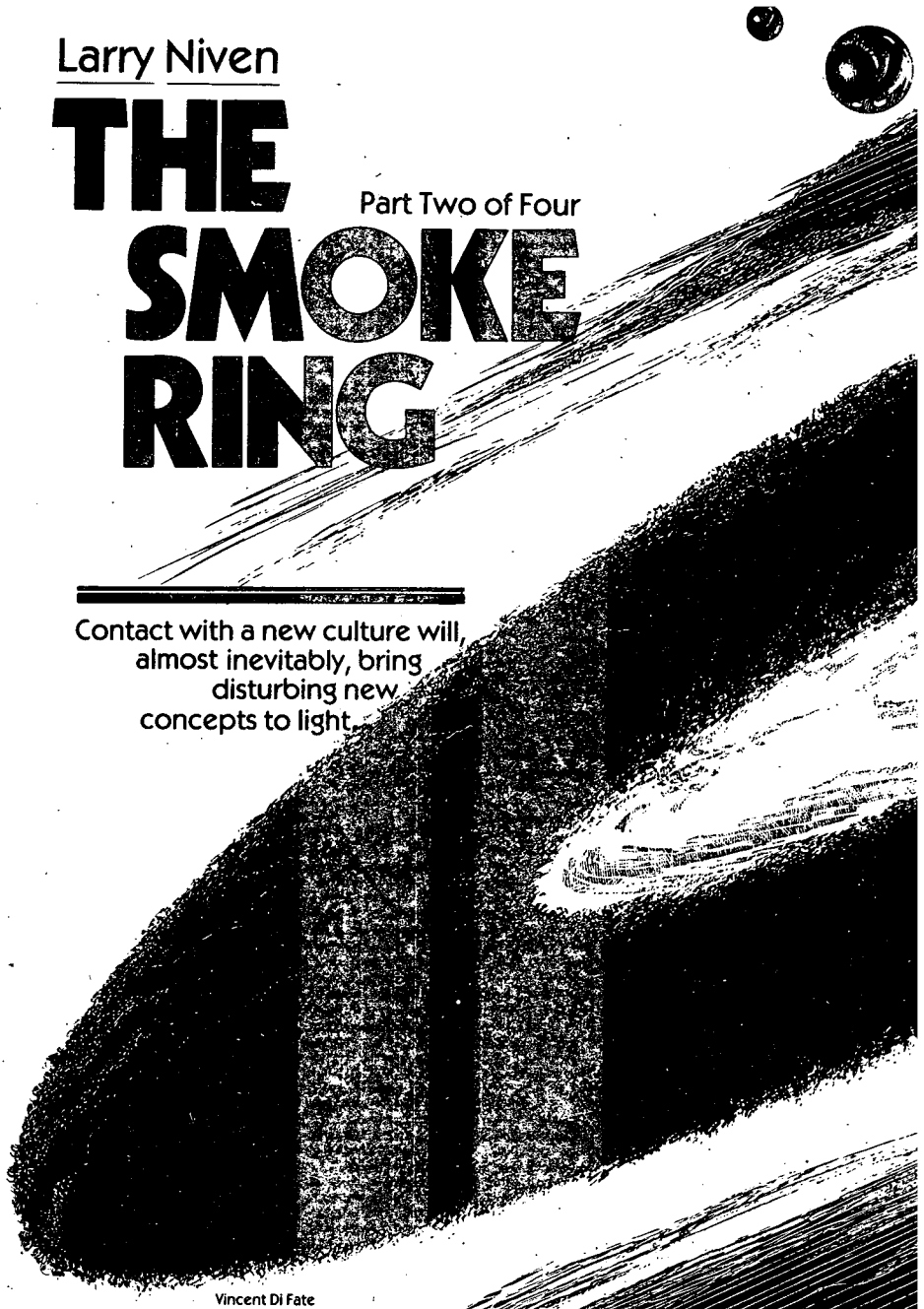
Larry Niven

THE SMOKE RING

Part Two of Four

Contact with a new culture will, almost inevitably, bring disturbing new concepts to light...



Vincent Di Fate

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SYNOPSIS

Levoy's Star **(Voy)** *is the ashes of an ancient supernova, a "cold" neutron star of half a solar mass, probably on the order of a billion years old.*

A gas giant planet circles Voy at 30,000 kilometers. Goldblatt's World **(Gold)** *orbits within, and continually leaks its atmosphere into, a gas torus surrounding the neutron star.*

A gas torus is inherently thin; but at the median line the air is thick enough to breathe. It has the appearance of a green-tinged **smoke ring:** *clouded by water droplets, and green with life that has been evolving in free fall for a billion years. The Smoke Ring is illuminated by a G-type companion star, and includes rock and water and soil lost from Goldblatt's World during its first catastrophic approach to Levoy's Star. Its volume—the foggy region dense enough to support life—is around thirty times the Earth's volume.*

Five hundred years ago, men entered the ecology, via the interstellar ramship **Discipline.**

Sharls Davis Kendy *(once a Checker for the State on Earth, now a computer program for* Discipline*) does not remember a mutiny. He must have edited those memories himself. He knows only that he abandoned his crew to their fate within the Smoke Ring.*

He has waited in the L2 point outside Goldblatt's World for more than five hundred years. Surely the tools and knowledge the mutineers took with them will eventually help them to rebuild within the free-fall environment. Once they have something like a civilization, Kendy can help them rebuild the State.

Recently, the Smoke Ring's last working Cargo and Repair Module left its orbit within the Smoke Ring. A dozen inept pirates brought the stolen **CARM #6** *close enough for Kendy to communicate, before their craft dropped back into the Smoke Ring.*

Humankind is few but has spread far. Some settled the cotton candy jungles, fluffy puffs of vegetation that grow up to several kilometers across. Some settled the tufts of the **integral trees**. *These trees grow up to a hundred kilometers long; tidal effects hold them vertical to the neutron star. The tufts are the only place in the Smoke Ring where one may live under (minuscule) gravity.*

Humans have turned strange. Tree-dwellers run around two and a half meters tall. Jungle dwellers grow taller yet. Deformities are common—legs of different length, even no legs—and are not considered handicaps. Their toes are like stubby fingers. Humans of normal size are called "dwarves." They may be poor material on which to build a new State; but what else is there?

Kendy waited twenty Earthtime years, then set forth to find CARM #6. He now knows that his twelve contacts have settled a sixty-kilometer tree. It presently orbits west of the fourth Lagrangean point, the point of gravitational equilibrium sixty degrees east of Goldblatt's World. They call themselves **Citizens Tree**.

The starship now passes within range of CARM #6 once for every two of Citizens Tree's orbits. Kendy is in secret communication with **Jeffer the Scientist**.

Citizens Tree has lived in peace and quiet for fourteen years by Smoke Ring counting. The carm can be used as a

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motor for the tree; and nothing terrible can happen to a mobile tree. But they stay clear of other tribes.

Now comes excitement in the form of a burning tree. Jeffer uses the carm to push the tree out of its path. Five living refugees reach the trunk; the sixth, **Wend**, *dies of her burns.*

Booce *and* **Ryllin** *and their three living daughters* **Mishael, Karilly,** *and* **Carlot** *come from what Citizens Tree calls the* **Clump**: *L4, the fourth Lagrangean point.*

Booce calls it the **Admiralty**. *Civilization there houses more than a thousand people, not counting children. They sell a wide variety of earthlife crops, and Citizens Tree has none. Booce and his family are loggers: they use a steam rocket to find trees, push them home, and sell them for lumber. They tell incredible tales of a civilization far beyond that of Citizens Tree. They speak of the Library, a source of knowledge left over from ancient times.*

The wings Booce's family used to reach safety are easy to duplicate, and by now most of Citizens Tree has tried flying. Jeffer, **Chairman Clave**, *and* **Anthon** *were able to retrieve elements of the steam rocket from the burned tree.*

Booce and some of his family would like to return. Their tales and persuasions have caused a split throughout Citizens Tree.

Shall the citizens investigate the Admiralty for knowledge and earthlife seeds, or shall they avoid both knowledge and danger? Chairman Clave intends to move the tree even further from the Clump. **Minya** *wants to integrate the Booce family into their society with as little fuss as possible. She has persuaded her husband* **Gavving** *to take Mishael as a second wife . . . and Gavving has done that, but for his own reasons. If Booce and Ryllin are to be their escorts in the Admiralty, they will be more trustworthy if some of their family are of Citizens Tree.*

Kendy is desperate to learn more. Ideally, he would like to use the Admiralty as a kernel for the new State. Jeffer distrusts him, but feels the Admiralty should be investigated. Ultimately a conspiracy forms, and half a dozen citizens move to capture the carm.

The quasi-mutineers take the carm during Clave's attempt to move the tree. Clave recognizes a fait accompli. He maneuvers, not to stop them, but to remove the onus of mutiny. By the time he finishes talking, Gavving has returned as Chairman Pro Tem, taking Ryllin with him, and Clave himself has become captain of the expedition. All of this maneuvering is intensely interesting to Kendy. Clave has the instincts of a good Checker.

The crew that sets out to meet the Admiralty includes Booce, his youngest daughter Carlot, Jeffer the Scientist, **Debby**, *and* **Rather**, *eldest son of Minya and Gavving (or possibly Mark.)*

Rather is a dwarf. He's the only citizen, aside from Mark, who can fit into the invulnerable armor stolen from London Tree: the silver suit. To fourteen-year-old Rather, the lure was irresistible. It isn't just the adventure. He was a dwarf of uncertain parentage; but he is now the **Silver Man**.

They will not risk the carm by taking it into the Clump (though Kendy desires exactly that). They will use Booce's skills and the power of the carm to re-

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build Booce's steam rocket, Logbearer. *They will arrive as loggers.*

SECTION TWO: THE LOGGERS

Chapter Seven: The Honey Hornets

From the Citizens Tree cassettes:

Year 384, day 1590. Jeffer, Scientist. We have departed Citizens Tree to explore the fourth Lagrange Point, with attention to resources and population. The mission as outlined is revised as follows: Chairman Clave now leads. This expedition has become an approved activity of Citizens Tree. I now turn the log over to Chairman Clave.

Clave, Chairman. Crew consists of Jeffer as Scientist and Captain, Citizens Debby and Rather, Booce and Carlot Serjent as guides, and myself. Priority at all times will go to protecting the carm and other vital property of Citizens Tree. No knowledge is worth gaining unless it can be reported to Citizens Tree.

Carlot was watching over their shoulders. "You use—"

"Prikazyvat end log," said Jeffer.

"—the same dates we do?"

"Why not?"

"Well, how do you know?" Carlot demanded. "Years, you just watch for the sun to go behind Voy, but what about days? We sleep a couple of days out of five, right? But maybe you lose count—"

"Who cares?" Clave said. "Who knows how many days there are in a year? It depends on where you are."

Jeffer summoned up numbers on the panel. "The carm logs a standard day, about four and a half per sleep. We used to keep marks on sticks in the Scientist's hut. How do you keep time?"

Carlot said, "The Admiralty posts the time."

Booce laughed. "They must get it the same way! The Library looks a lot like this panel, Jeffer. Like somebody ripped out this part of the carm."

"Keys like this too?"

"I wasn't close enough to see. They don't let ordinary crew near it. Let's see . . . in the crossyear ceremony Radyo Mattson did the talking, but there was a Navy officer standing in front of the Library, and his hands moved . . ."

And Kendy watched them all.

The carm autopilot heard everything. Every ten hours and a little, it squirted its records at *Discipline*. Kendy sorted the conversations for what he could use.

Two CARM autopilots separated for five hundred thirty-two years and eleven months were both keeping Smoke Ring time, with *Discipline*'s arrival set at zero. Interesting. The mutineers must have adjusted them after it was certain that they would never return. They had severed relations with the past, with Kendy, with Earth, with the State itself.

Yet they used *mutiny* as an obscenity. Puzzling.

The carm flew east, airspeed 71 kph, partially fueled, carrying water that would become fuel. Solar collector efficiency was running at 52%, the collectors partially shadowed by the old pipe moored to the hull.

It was a liquid oxygen pipe ripped from a CARM. Many Carms must have been dismantled when they stopped working. The Admiralty "library" was certainly the control panel from a ruined CARM; but was it still functional?

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The cabin interior was offensively dirty. Kendy detected traces of old meals eaten aboard; feathers and bird shit from the turkey roundup ten years back; the black clay that had returned the same trip; and mud repeatedly expelled from the water tank. Dirt was not dangerous, only aesthetically distressing. Kendy foresaw no problems other than those of microsociology.

He was on course.

Humankind was scattered. No telling how far they had spread through the Smoke Ring. They had settled cotton candy jungles and the tufts of integral trees; he knew of four tiny civilizations outside the L4 point. But the Admiralty seemed to be the densest gathering, the most numerous, the best organized; the political entity most suited to become the heart of an expanding empire.

It would not resemble the State at first. Conditions were fantastically different: Never mind. Give them communications, gather them into one political group. First things first.

He must know more. Hearsay from a family of wandering loggers wasn't good enough. The Admiralty "Library," *that* would tell him how to proceed next . . . but he already knew that he must eventually contact the officers themselves.

Somehow the carm must be moved into the Clump.

Jeffer had seemed to have matters well in hand. The effects of mutiny on Citizens Tree did not concern Kendy . . . but Clave had ended a mutiny by joining it! Now he must persuade Jeffer and Clave both. But Kendy couldn't talk to Clave. Exposing Jeffer's secret would lose Jeffer's trust.

It was precisely the kind of problem a checker enjoyed most.

For now Kendy watched six savages in a recording made over the past ten hours. They had much to teach him.

Booce speaking: "We own—owned our own ship. I suppose that made us richer than most. I inherited *Logbearer* from my father, and I made my first trips with him. Ryllin was another logger's daughter, and she was used to the life. We had four daughters and a few lost ones out of maybe twenty pregnancies, all while hauling logs. I've become a good maternity doctor—" The cassette ended.

Men had changed in the Smoke Ring.

Pregnancy was easy in low gravity. Women became pregnant many times during their lifetimes.

Infant mortality ("lost ones") was high, perhaps around sixty percent; the natives seemed to take it for granted. *Discipline* had carried no diseases. Yet the growth of bones and organs was altered by altered gravity. Some children could not digest food. Some grew strangely, until their kidneys or livers or hearts or intestines would no longer work because of their shape.

The environment was user-friendly for those who survived childhood. Kendy's citizens came in odd shapes. Kendy caught a reference to Merril Quinn and learned that she had died six years ago, in early middle age. Merril had had *no* legs. She had fought against London Tree, and not as a cripple.

Distorted children had wandered through the CARM to be photographed. Ryllin Serjent had an awesomely long neck, quite lovely and graceful and frag-

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GLOSSARY

BRANCH—One at each end of an integral tree, curving to leeward.
BRANCHLETS—Grow from the spine branches and sprout into foliage.
CARM—Cargo And Repair Module. *Discipline* originally carried ten of these.
CHECKER—Officer entrusted with seeing to it that one or a group of citizens remains loyal to the State. Checker's responsibility includes the actions, attitudes, and well-being of his charges.
COPSIK—Slave. (Derives from *corpsicle*. In the State, corpsicles had no civil rights.)
COPSIK RUNNER-Slavetaker or slavemaster.
DARK SHARK—a predator of the Clump Interior.
DAY—One orbit about Levoy's Star, the neutron star. A *standard day* is an orbit of Goldblatt's World.
"FEED THE TREE"—Defecate, or move garbage, or die.
FISHER PLANT—boll-shaped, reaches toward ponds with a long water-inflated root.
FISHER JUNGLE—is a large fisher plant with sting. May attack big birds as well as ponds.
GO FOR GOLD—rush headlong into danger, or disaster, or battle.
GOLD—See *Goldblatt's World*. Secondary meaning: something to avoid.
GOLDBLATT'S WORLD—Gas giant planet captured after Voy went supernova/neutron. Named for *Discipline's* astronomer, Sam Goldblatt.

ile-looking. Carlot's legs . . . Kendy wished he could see her walk or run.

They matured more slowly. Carlot claimed fourteen and half years; she would be twenty by Earth's reckoning. But she looked no more than fifteen.

Men had not evolved for the Smoke Ring. Infant mortality must have been ghastly among the original crew. Five hundred years of natural selection was taking care of that. As with the cats a few generations back: the near future should see an impressive population explosion.

explosion.

Kendy would guide the civilization that resulted. He had been right to move *now*.

The CARM was coming back into range. Kendy's telescope array picked it up falling east and out, slowing.

In present time Booce and Carlot and Rather were on watch while the others slept. The CARM moved through a patch of thin fog. Fog didn't block the CARM's senses. Kendy noticed the anomaly some time before the crew did.

He saw birds of unfamiliar type. They had lungs (the CARM's sonar could see the triple cavity) but they had retained part of what must once have been an exoskeleton; an oval of hard sky-blue shell covered one side. Fourteen of these birds, each about the mass of a boar pig, were strung in a line across the sky. They were folded into themselves, fins and wings and heads folded against that oval of shell. Sky-blue blobs, cool in infrared, comatose or dead.

Booce had noticed now. He shook Jeffer awake. "A whole flock of dead birds. What killed them?"

"Nothing that can touch us with the

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airlock closed." Jeffer's fingers danced. "Outside air's okay, nothing poisonous. Well, *treefodder!*"

"What?"

"The temperature. It's *cold* out there."

Kendy had already found the source of the cold.

The present-time transmission showed Jeffer easing the CARM alongside one of the big birds. The other crew were in and around the airlock. Debby sent a tethered crossbow bolt into the bird. It twitched. She loosed another . . .

. . . While Kendy set a blinking light around the image of the pond.

Only Jeffer was there to see it. He said softly, "Stet."

They had pulled the bird aboard. Clave said, "Well, it's dead now."

"I've got something," Jeffer said. "Clave, there's a pond in that dense cloud. Do you see anything odd about it?"

"No life around it. That cloud's awfully thick for being so small. What does it mean?"

"I don't know."

Ice. The pond was a core of foamy ice within a shell of meltwater. Ice was rare within the Smoke Ring. The pond was huge now, several hundred thousand tons, but Kendy guessed that it had been bigger yet. A tremendous pond must have been flung out of the Smoke Ring by a gravity-assist from Gold. In the near-vacuum of the gas torus it would have boiled and frozen at the same time, and later fallen back, reduced by evaporation, reduced further by reentry heat. Now it cooled the sky around it as it melted. Kendy could hear the *pings* as bubbles of near-vacuum crumpled within the ice core.

"I don't like it here," Booce said. "It's too strange."

"Your wish is granted. Strap the bird down and take your seats." Jeffer waited while they did that, then fired the aft attitude jets. The carm surged away.

Carlot pointed into the aft view. "Look!"

The shieldbirds tumbled in the carm's hot wake. One by one they fluttered, then spread a rainbow of wings and tails and fluffy feathers. They basked in the heat, catching as much of it as they could. Now their shells were no bigger in proportion than a warrior's shield. As *Discipline* moved out of range, the birds were lining up and flying west, putting distance between themselves and the melting glacier.

"There's no point picking out a tree till you've got honey," Booce said. "You can find a tree a hundred klomters from the Clump and still go half a thousand klomters to find your sting jungle."

Their catch was moored by cargo hooks, divested of skin and guts and some of the scarlet meat. Booce was holding raw bird flesh sliced thin and rolled around a stalk of lemon fern. He used it to point into the dorsal view. "And *that* is a sting jungle. The green dot, straight out."

"Stet." Jeffer tapped attitude jets to life. The carm turned. Carlot squeaked and grabbed Rather, startling him awake. Booce dropped his meal to snatch at a seat back.

Jeffer hid a grin. These sophisticated Admiralty folk found the carm as unsettling as Jeffer's own citizens did.

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HAPPYFEET—Mobile tribes. (An Admiralty term.)

HONEY—Sticky red fluid, used as a lure for treebugs.

HONEY HORNETS—Deadly insects. They secrete nerve poison.

INTEGRAL TREES—A crucial plant.

JUNGLE—decribes almost any extensive cluster of plants.

LEVOY'S STAR—A neutron star, the heart of the Smoke Ring system. Named for its discoverer, Sharon Levoy, Astrogator assigned to *Discipline*.

PRIKAZYVAT—Originally, Russian for "command." Presently used to activate computer programs.

SMOKE RING—The thickest region of the gas torus that surrounds Goldblatt's World in its orbit around Levoy's Star.

SPINE BRANCHES—grow from the branch of an integral tree.

STET—Leave it the way you find it.

STING JUNGLE—Smoke Ring plant, generally houses honey hornets.

SUN—a G0 star, also called *T3*, orbits Levoy's Star at 2.5 × 108 kilometers, supplying the sunlight that feeds the Smoke Ring's water-oxygen-DNA ecology.

THE CLUMPS—the L4 and L5 points for Gold. As points of gravitational stability, they tend to collect matter.

TREEFODDER—is anything that might feed the tree: excrement, or garbage, or a corpse.

TRIUNE—A Smoke Ring bird, large and often dangerous.

VOY—See LEVOY'S STAR.

YEAR—One passing of T3 behind Voy. Half of a complete sun-circuit, equals 1.384 Earth years.

DIRECTIONS:

OUT—away from Levoy's Star.

IN—toward Levoy's Star.

EAST—in the orbital direction of the gas torus.

He aimed the carm east of Booce's green dot. East takes you out . . . "Half a day and we'll have honey. What else do we need?"

"Some way to collect it," Booce answered.

"We'll put Rather in the silver suit. No treefeeding insect will sting him through that!"

"Right. Better than armor."

"Tell us about the Admiralty," Clave said.

Booce closed his eyes to think. Then, "You're lonely out here. There's too much space. Everything is dense in the Clump. Think of a seed pod, and think of the Admiralty as the shell. There are more people in the Market alone, any time of day or night, than you've ever seen.

"We pull the logs back to the Clump over the course of a year or two, and we arrange an auction in the Market. Twice we've been attacked by Happyfeet bandits. Once we got back just as another log was being docked, and we got half what we expected for the wood. But over the years we put enough money together to buy my retailer's license. This was going to be our last trip. We were going to settle in the Clump, and I'd work the wood myself and sell finished planks and burl, while Ryllin set about finding good husbands for our daughters. That was the point: they're reaching that age—"

Clave asked, "Can we really make the Admiralty believe we're loggers?"

"We'll *be* loggers," Booce said. "Rebuilding *Logbearer*'s no problem. We should have more weapons in case Happyfeet come by, and it all has to look like Admiralty gear . . . and we

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WEST—against the orbital direction of the gas torus. The way the sun moves.

SOUTH—to the left if your head is Out and you're facing West, or if your head is In and you're facing East, and so forth. Along Levoy's Star's south axis. Direction of the Ghost Child.

ROCKET—Term refers only to the steam rockets used by the Admiralty and Seekers.

NORTH—opposite South. Along Levoy's Star's north axis. Toward the Blue Ghost.

DOWN and UP—usually applied only where tides or thrust operate.

SPIN, ANTISPIN, DARK—and SKYWARD are directions within the Clump.

The general rule as known outside the Clump is, "East takes you Out. Out takes you West. West takes you In. In takes you East. Port and Starboard bring you back."

still won't look like a typical logging family. But we don't have to, because I've got my retailer's license."

"What does that mean?"

"It means we don't have to sell the log straight off. The Navy ships will escort us in and give us a berth. I can set up shop in the Market and sell wood, and hire anyone I like; which means that the rest of you can be workers hired off a happyfeet jungle, or bought as copsiks. Some of the happyfeet keep copsiks. The Admiralty doesn't, so you'd be free if I bought you."

"Free, but not citizens."

"Right."

"Why can't you have hired us off a tree?"

Booce thought about it, and smiled. "You have a gift, Clave. Tell as much of the truth as possible. Debby, you're from Carther States, directly. You were stranded in the sky, you made your way to a tree, and now you want to live in a jungle again. Okay, Debby?"

Debby's lips were moving as she silently repeated the details. "Stet."

"We'll have to say Citizens Tree is close to the Clump. Otherwise we got home too fast, and we'd have to explain about the carm."

Clave nodded. "So then we sell the log. How?"

"Set up in the Market and announce an auction. Buy your earthlife seeds with the money and go home. The Admiralty'll take half in taxes—"

Clave exclaimed, "Half?"

Jeffer said, "Taxes?"

"Taxes," Booce said, "is the money the Admiralty takes to run itself. Everybody pays, but the rich pay more. A good log is wealth. For the price of the carm you could be very rich indeed."

"The carm is what makes us what we are. We won't risk that," Clave said.

"Then don't take it into the Clump. The Navy won't want something that powerful floating around. They'll pay well, but they'll buy it whether or not you're selling."

Jeffer tapped the forward jets awake. They were pulling near the sting jungle.

Certain mooring loops fit the silver suit too perfectly, as if it were their specific purpose. Four sets. For four suits?

Jeffer pulled it loose. "The silver suit is yours, Rather. I'm going to teach you everything about it."

Rather had seen the silver suit as a mark of rank. He hadn't thought of it

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as an obligation. "Did Mark show you how to work it?"

"I've watched him. Lift this latch. Take the head and turn it till it stops. Pull up. Turn it the other way. Lift. Now this latch. Now pull this down . . . pull it apart . . . good."

The suit looked like the flayed skin of a dwarf.

Legs first, then arms. Duck under the neck ring. Rather closed the sliding catches, the latches. "Do I have to close the head?"

"Cover yourself. You don't want to be stung," Booce said. "Those little mutineers can sting a moby to death."

Rather closed the headpiece. He said, "The air's getting stale."

They couldn't hear him. He couldn't really suffocate this fast, could he?

Jeffer lifted the headpiece. "*Listen* first. Put your hand here." He guided Rather's fingers to a row of square buttons on the outside of the neck ring. He pushed one (colored lights lit below Rather's chin) and another (air jetted inward from all around the neck ring.) He used Rather's fingertip to roll a small wheel back and forth (the air jets grew weaker, then stronger.) "Close the helmet."

Rather did as Jeffer had shown him. Air from the neck ring hissed around his head.

Clave was saying something inaudible. Jeffer guided Rather's fingertip to another tiny wheel, and suddenly Clave's voice was a roar. "—use up the air? Does that thing have to be closed? We're not going back out of the Smoke Ring again, are we?"

"Let's hope not. Rather, you're leaking. Close that flap at your chest. The way Booce talks about honey hornets, you don't want anything open."

Rather felt it out, then used finger pressure to close a snap he'd missed.

Now he was being shown little wheels on his chest. He moved the left one experimentally. His left foot kicked upward and he was wheeling in the air, banging his head and elbow, snatching for a mooring loop while his other hand rolled the wheel back to zero. He banged both knees before he could stop his spin.

Clave and Debby were helpless with laughter. Jeffer had jumped clear. "Leave those alone while you're inside! You fly with those. Now I'm going to walk you out the airlock. Play around with the jets. If you get in trouble we'll come after you."

Rather braced himself in the airlock, feeling imprisoned. The sting jungle was a fat, fluffy ring half a klomter across, dark green around the outside, slowly rotating. The inner rim flamed in orange and scarlet. Rather, looking out through the airlock, saw motion there like jittery fog.

Clave and Booce eased him into the sky.

They couldn't have any idea what the boy was going through, Kendy thought. How would they? None could fly the ancient pressure suit. Rather would have to be an agoraphile and an acrophile both.

Kendy had explained the pressure suit with diagrams and pointers; but had he shown Jeffer how to replenish the suit's oxygen and fuel? Replay that memory . . . no. Do that soon, if it wasn't already too late. What Kendy was watching was already two hours past.

But the carm was in range again, and in present time the boy was aboard, and out of the suit, and still alive. Kendy

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kept the tape running:

Debby and Clave hovered a safe distance away. The boy floundered. He was all over the sky, spinning, faster . . . slower, tilting himself back and sideways to slow the spin . . . learning to move arms and legs to change his attitude. He found the throttle dials and turned both jets to minimum. He circled the CARM, then arced off toward the green doughnut that Booce had made his target.

Jeffer spoke through the suit radio. "Not yet, Rather. Come back. You don't have anything to carry the, the, *Booce?*"

"Honey."

"The honey. Booce, what does he need?"

"That's what the sacks are for."

Rather oriented toward the carm; increased the thrust; doubled on himself for two seconds, then arched backward as he fell toward the airlock. Fire sprayed from his ankles, arcing forward. Nice, Kendy thought. Of course he wasn't a complete novice. He'd flown with those giant swim-fin fans.

The boy left his helmet open (but didn't turn off the air jets!). Debby began strapping twelve coarse sacks to his back, got yelled at, and strapped them to his chest instead, where he could reach them. She used several loops of line. The savages were never without line, Kendy recalled. Good practice in a free-fall environment.

In present time Rather was leaving the airlock again, and the signal was fading. Kendy waited.

The great green torus became landscape as Rather came near. It was darker than integral tree foliage, and fluffy, finely divided to catch as much sunlight as possible. Scarlet and orange peeked over the curve, becoming clearer. Orange horn shapes, rocket-nostril shapes, quite pretty. Thousands of them.

The jittering mist cleared too: not steam roiled by wind, but myriads of particles swirling round the blossoms, dipping in and out. Now the motes abandoned the horn shapes and streamed toward Rather.

They were all around him, a humming black cloud of rage.

"Scientist? I'm in the center. I can hardly see. The honey hornets are—"

"Look for red," said Booce's voice.

Orange and scarlet. Orange horns the size of drinking gourds, and scarlet of another shape. Rather jetted closer.

The honey hornets came with him. Thousands of thumb-sized birds: tiny harpoon for a nose, invisible blur of wing behind. He could hear the angry buzz through his helmet. "I've got a red thing . . . Booce, it's a kind of a sloppy polyhedron half a meter through, covered with lots of little triangle holes. It's growing between these horn-shapes."

"Those are flowers. It didn't grow there, it's attached. Did you take a knife?"

"No. Wait a breath, there's a machet on my leg. It must be Mark's."

"Cut the honeypod loose and put the sack around it. Tie the neck shut."

Rather swung the machet behind the scarlet polyhedron. The silver suit made all movements stiff. Presently the honeypod was floating loose. Rather pulled a sack free, opened the mouth, and swept it around the honeypod.

"Got it? Tie the bag *shut*. Done?"

"Done. There's sticky red stuff all over my gloves."

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"Stet. Now keep doing that till you run out of sacks. Don't lick the honey."

"With my helmet closed?"

"Don't *ever* lick honey. It's suicide."

Chapter Eight: The Honey Track

From the Citizens Tree cassettes, year 1426 State

GOLDBLATT'S WORLD

Goldblatt's World may have begun life as a Neptune-like body in the comet cloud around the paired stars. In Goldblatt's scenario, the body was captured some millions of years after the supernova event. The collapsing core of the supernova, spewing its outer envelope asymmetrically due to a trapped magnetic field, may have picked up a skew velocity that nearly matched the velocity of the proto-Neptune. Robbed of its orbital velocity, Goldblatt's World would fall along a drastically eccentric orbit, passing very near Levoy's Star. Extreme Roche tides would warp the orbit into a circle within a few scores of passes.

It seems likely that Goldblatt's World's orbit and the associated gas torus have been contracting for all of their billion years. Meanwhile Levoy's Star has been cooling—since neutron stars no longer undergo fusion—maintaining a relatively stable balance of temperature in the Smoke Ring.

Note that the Roche Limit is never an absolute. It varies as the density of the orbiting body. A gasball world may be within its Roche Limit, and this one probably was. But the rock-and-metal core is dense. Goldblatt's World would have been well outside its Roche Limit after the gasball lost some of its gas and the eccentric orbit became more circular.

The planet is now no more than two and a half times the mass of Earth . . .

—Sam Goldblatt, planetologist

"You see the problem? Too much of it is gibberish," Jeffer told the children. Rather and Carlot were nodding, but their eyes were glassy. "You can look up some of the words. You can guess a little. Goldblatt's World is Gold. There's a file on Earth and Neptune and the rest of the solar system, but it's hard going. Roche tides, Roche Limit, that seems to be a balance point between tide and some other force, maybe the same force that changes your orbit if you pass too close to Gold. Fusion is power: it makes the Sun burn, and *Discipline* ran on fusion. Oort cloud, magnetic field, supernova—Lawri and I never figured those out."

He turned to Booce. "The kids need this, but I hate to make you sit through it again at your age—"

Booce's eyes were glassy too. "No, no, no. This is all new to me."

"Didn't you have classes? There's the Library—"

"For officer's kids only," Booce said brusquely. "Go on with this. What's eccentric?"

"That's a round path that isn't a circle. It goes out and in. Booce, am I committing a crime if I teach you and Carlot these things?"

"But I want to learn!"

"Shush, Carlot. It's never come up

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before," Booce said. "You're not showing us the Library, after all."

Carlot demanded, "Scientist, what's the point in stopping *now?*"

Jeffer laughed. He tapped, and the window was restored. The Clump was nearer now, and a score of parallel dashes lay across the carm's path. "You're right, Carlot, but the lesson's over anyway. We're getting too close."

Debby answered with a raspberry.

"Booce? Any special favorites?"

"The smallest, I'd think, but let's have a better look." Boocc disengaged his seat tethers and moved aft. "Jeffer, would you open those doors?"

"Will do." He did. "Booce, don't you trust the windows?"

"I prefer my eyes. Swing us around, will you?" He braced himself in the airlock. Others of the crew had followed him.

Jeffer began the maneuver. In the forward view, now moving into the port view, one of the trees had begun blinking: a green halo going on, off, on, off.

Nobody was near. Jeffer whispered, "Why?"

Now a point far in along the trunk was doing the blinking. Then that stopped—

An arm stabbed past Jeffer's ear, and he had to repress a shriek. "There," Booce said, pointing at one of the trees. "Thirty klomters, and it seems healthy."

"What about this one, Booce?" Jeffer tapped the tree that had blinked at him.

"Nothing wrong with it. It's bigger, twice the mass. Take us longer to get it to the Market, but of course there'd be more wood, too, and there's the carm . . . Why that one?"

"A hunch. You've got no objection?"

Now Clave was behind him too. "Jeffer, are you playing dominance games?"

"I—"

"I'm the Chairman, you captain the carm, Booce is the logger. Booce chooses the tree."

Jeffer repressed a sigh. "Yes, Chairman. Booce?"

Booce pointed to Jeffer's selection. "That one."

Ten klomters above the tuft, the wood of the trunk had grown to enclose a node of foreign matter. Jeffer saw Booce catch his daughter's eye as Carlot was about to speak. She held her silence.

At the tree midpoint Jeffer nosed the carm against the trunk. He ran the attitude jets while his crew pounded spikes into the bark to mark a rectangle the size of the carm's bow. The carm drifted while they chopped out a dock with machets.

Even on this younger tree, the bark was a meter thick. They made life easier for themselves by chopping along cracks. The five of them lifting together could rip great mattresses of bark away from the wood beneath, then saw off sections. Booce and Carlot used the saw, then let others take over until they got the hang of it.

Booce and Carlot rejoined Jeffer in the carm. Booce said, "They seem to be doing all right."

"But it's *scarred,*" Carlot objected.

"And how much wood will that cost us?"

She shrugged. "Five percent? And

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weren't we in a hurry to get home?"

Booce was smiling. "Exactly. Jeffer, why this tree?"

"You'll be painting a line of honey down the trunk, stet? Have a look at that scar."

"Can you tell me what I'm supposed to find?"

"No, I can't."

"Jeffer the Scientist, Citizens Tree gave us shelter and a place among you. We're grateful. I will not quarrel with any decision you make. You won't need to test it again."

Jeffer could feel his ears and cheeks burning. "If that scar isn't more interesting than you expect, you can count on it that I won't make a fool of myself twice. Stet?"

"Stet. I won't raise this subject with the Chairman, ever."

"You are kind. What's next?"

"The honey line."

In the cabin the roar of the main drive was like a great beast heard from far away, but outside the airlock the roar was deafening. A translucent blue flame reached out from the carm's main rocket nostril. Warmth backwashed against the bark.

Carlot's eyes were big with fear. Rather pulled at her arm to set her kicking toward the in tuft, and followed, with Booce following him.

They stopped where the noise had decreased somewhat. The rough bark itself absorbed sound. Booce screamed, "That noise is beyond belief! What is that damn carm, a ship from the stars?"

"Jeffer says it rode here on the starship. My father never saw *Discipline*." What Rather said would be true whoever his father was. "But he's seen the stars. They're real."

"I'm afraid of it. I admit it. Look, the noise is scaring the bugs out of the bark! Let's get to work."

Booce used a branchwood machet to open a hole in one of the honeypots. The interior was partitioned; the cells held red, sticky honey. Booce used the blade to paint it on the bark.

"You'll find a few hornets still in there," he told Rather. "They try to sting through the sack if you give them a few days to get restless, and then they die. But don't count on it. Don't let one get at you. Now you paint dabs a couple of meters apart. Closer, you waste honey. Further apart, the bugs lose their way."

Rather had thought he was a climber, but this was different. He had problems keeping up. He was almost lost among the sacks he was carrying. Booce and Carlot climbed head down; they would have left him behind if Booce had not been stopping to paint the trunk.

They took a breather when the sun was at nadir and the shadows had become confusing. The sun was passing closer to Voy as the year waned.

A day later they took a longer rest. "This is the part I like best," Booce said. "We're usually in too much of a hurry. This time your carm is already pushing us home. We can take our time, do what we like!"

"Like what?"

"I'll show you as we go." Booce began tearing up sheets of bark greater than a man, mooring them edgewise against the bare wood. When he had them arrayed he set them alight.

The smoke tended to stay where it

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formed. Booce moored a four-kilgram slab of shellbird meat in the cloud. They broiled smaller steaks on their machets, closer to the fire, and ate them still hot.

"The smoked meat will keep till we're down," Booce said. "But there are other things on the trunk. You've never climbed?"

"When we were children we did a little climbing, but just on the lower trunk. We weren't supposed to go more than a klomter up. If you fell the foliage would catch you. Any higher, we rode the elevator."

They slept carefully tethered in cracks in the bark. Sometimes, for moments, the roar of the carm could be heard above the wind. A dark cloud had formed above them and was gradually drifting down.

The bugs of the tree had found the honey.

They breakfasted on smoked bird. Then Carlot did the painting while Booce carried the food.

The sun circled them, once and again. Always they stopped when the shadows were pointing straight out. Water was beginning to flow sluggishly in alongside their path. "Bugs like it damp," Booce said. "The bark's wet enough for them around the midpoint, but not lower down. You have to paint down the east side, alongside the waterfall, or they won't come. Also the trunk blocks the wind. You don't want the bugs blown away."

There was fan fungus like so many pallid hands reaching from the bark. Carlot showed Rather how to tear the red fringe off before eating the white interior. It was bland, almost tasteless, but went well enough with the strongly flavored smoked meat.

With lunch came entertainment: a gust of roses on the wind. The stems were four meters long. Dark red blossoms fragile as tissue paper pointed straight toward Voy, soaking up blue Voylight. Rather had never seen the like. He and Carlot watched the roses blowing east untlil they were out of sight.

Rather took his turn painting. Booce kept a close watch, but it seemed simple enough. A dab the size of a baby's hand; the next dab two meters lower.

A dark cloud flowed after them down the trunk.

The wind grew stronger, though the trunk blocked most of it. The growing tide made climbing easier for Rather. The water flowed more strongly. It was cleaner than pond water, cleaner than the water that reached the basin in the commons. It tasted wonderful, and painting was hard, thirsty work.

In two days Rather's arm was one long cramp.

He was too tired to help with dinner. Booce managed alone. He found shelled things hiding in the bark and pulled them loose. Roasted, their white flesh made a fine meal.

Again they wedged themselves along a wide crack in the bark, with Carlot between the men. There were dangers on the trunk.

Rather's aches kept him awake. He presently noticed Carlot's feet stirring restlessly. "Carlot?"

He would not have spoken twice, but she answered at once. "Can't sleep?"

"No. My father told me about climbing *up* a tree. When they got to the top

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the tree came apart."

"That's one reason we don't just chop off the tuft or burn it loose. This is easier, but it also gets the bugs away from the midpoint. When the tree dies, they're not there to eat it apart."

"How do you get rid of the out tuft?"

"Oh, some of the bugs won't follow the honey. They'll be breeding while we travel. When we get close to the Clump we'll paint another trail out."

"Why are you awake?"

"Tide. I have trouble sleeping in tide." But her voice trailed off raggedly. He stopped talking, and presently slept.

After breakfast Booce said, "There's something I want to see on the west side of the trunk. Leave the gear here."

Climbing was easy if you didn't have to paint too. In less than a day they had half-circled the trunk. Above them by a quarter-klomter, the bark bulged like a wave surging across a pond. They climbed toward that.

"Jeffer wanted us to look at this," Booce told them. "Something must have hit the trunk while it was younger. The wood's grown around it."

The wood bulged to hide it like some secret treasure. Rather was almost inside the crater before he could see anything. Carlot, ahead of him, had stopped. Booce was at his shoulder. Rather heard him gasp!

Carlot said, "Metal!"

"I must apologize to Jeffer," Booce said. "Metal indeed! The tree may consider it poisonous; see how reluctant the wood is to touch it! But the Admiralty won't think so."

Rather asked, "We want this?"

"We do. Secret auction, I think." Booce was deep into the crater, running his hands over the reddish-black surface of the metal. "Six or eight thousand kilos. No point in trying to move it. We'll have to show it to the Navy anyway, unless . . . hmm."

Carlot looked at her father. "We don't want to attract attention."

"Exactly. I have to think about this. Well, my merry crew, I think we've earned a holiday."

They climbed back around the trunk, taking their time. Booce knew just where to find the shelled burrowers. After lunch they spent a day tethered in the now strongly running waterfall, first washing each other and squeezing honey out of their clothing, then wrestling. They still got some painting in before sleeptime.

In twenty days they had reached the wild tuft.

Rather had never appreciated foliage before. It had surrounded him all his life. He gorged, savoring the taste and texture. "You love it too," he observed. "Carlot, Booce, why don't you live in a tree?"

"Oh, there's foliage in the Clump too," Carlot said. "All kinds. Rather, I can't wait to show you!"

They slept in foliage. Rather slept like a dead man, from exhaustion and the familiar sensation of sleeping under tide, in a womb of soft foliage. He woke early, feeling wonderful.

Carlot lay not far from her father. Her face was grief-stricken. She thrashed in slow motion, unconsciously trying to hold herself against the tide.

He took her hand, gently. "Hey.

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Nightmare?"

Her eyes opened. "Oh. Rather. I was trying to get to Wend. She was screaming and trying to fly with just her bare feet—" She shook her head violently and sat up. "Something I have to tell you."

"Okay."

"When we were swimming. Father noticed you were up."

"Up? Oh, *up*. You're very pretty," Rather said a little awkwardly.

"We can't make babies."

"We can't? Hey, the jungle giants and the London Tree citizens didn't have any trouble. I'm a dwarf, but—"

Carlot laughed. "*Father* says we can't. He wants me to marry another logger. I think he wants it to be Raff Belmy, from *Woodsman*, but definitely another logger. I thought I'd better say something before . . . well, before you got to thinking."

"Thinking. Well, it's too late, then."

"It's all right, then?"

"Sure. Go back to sleep." The truth was that Rather was almost relieved. Carlot with her clothes off made his head swim and his blood boil: an uncomfortable feeling.

And Booce didn't want his daughter to love a dwarf savage. Should he resent that? Somehow he didn't.

Breakfast was more foliage. Then Booce gave Rather the machet. "Pry the bark off. We want a complete ring of bare wood half a meter across. We'll paint along behind you."

Three and a half days later he was halfway around. The bark was soft, easy to pry loose, but the trunk must have been a good two klomters in circumference. They returned to the wild tuft to sleep and eat. Rather was one vast ache, but it still felt good to be sleeping in tide, in foliage.

After breakfast Rather was still on the machet. The Sergents seemed to share Citizens Tree's faith in a dwarf's superior strength. He finished the job before they slept again. They were ahead of schedule. Jeffer would not bring the carm down for them for another six or seven days.

From the base of the trunk they watched a moby attack the bugs descending along the honey track. Mobies normally skimmed clouds of bugs from the sky for their food. This was a tremendous creature, mostly mouth and fins, riding the wind toward the trunk and the bug-swarm at a hundred meters per breath. It realized its mistake just in time. It thrashed madly, gaping, irresistibly comical, as the wind hurled it toward the tree. Its flank smashed loose a shower of bark as it passed.

The bugs descended like a cloud of charcoal dust. They reached the ring of painted bare wood and spread to north and south. The cloud condensed, growing darker, swarming a few ce'meters out from the bark.

"Carlot. Do you like it on the tree?"

She nodded, watching the bugs.

"Booce? I've watched you. You like it here."

"I love it."

"Then how can you kill trees?"

Booce shrugged. "There are plenty of trees."

Chapter Nine: The Rocket

From Logbearer's *log, Captain Booce Serjent speaking.*

Year 384, day 1280. Ten degrees

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west of the Clump. We've found a grove and chosen a short one, 30 klomters.

Day 1300. Refueled in a raincloud. Everything's wet.

Day 1310. Anchored at midpoint of tree.

Day 1330. Ryllin and Karilly must have laid the honey track by now. Bugs are following them down to the tuft. I'll take *Logbearer* in to pick them up. We're all eager to return to the Admiralty, but there's no way to hurry the bugs.

Day 1335. Ryllin and Karilly are aboard. From the in tuft they spotted a pond 50 klomters west and a little in. The women argue that we can fire up the rocket and start our return without waiting for the bugs. The pond will let us refill the water tank. It would gain us twenty to thirty days.

Now it's my choice. There's a risk, but I've never yet held out against the women. I'll give up early, save time.

Day 1360. The bugs have reached the honey band around the tuft. Ordinarily I would be down there supervising, but I can't do that while we're under acceleration.

We maintain staggered watches against happyfeet. If they find us we can ready *Logbearer* for independent flight in half a day. The rocket is hot and running.

Day 1370. I'll stop feeding the pipefire soon. Let it burn out before the bugs cut the tuft loose. I can guide us into the pond on the last of our steam.

If the rocket runs dry it'll teach the girls caution. We'll still fill the tank before we reach the Clump. You always bump a pond or two when you're moving.

Day 1380. A mature tree is drifting to block our path. Dammit. Maybe it'll move past.

No further entries.

The carm picked them up on the branch and returned to its dock with the cabin half filled with foliage. Rather suspected that they would not eat foliage again, nor sleep in decent tide, for a long time.

He heard the argument when Clave wanted to restart the motor. "There's no point," Jeffer told him. "We'd be using fuel to fight wind. We're doing fine."

Booce added his voice to Jeffer's. "We'll sail even further in after the tuft severs. Leave us something to breathe!"

Had anyone else seen Clave glance aft? Clave had taken less than a breath to read the faces of his crew, but Rather had caught it.

Not so long ago, far away in Citizens Tree, Gavving had spoken thus to his eldest son: "'You're a citizen now. Watch Clave during a meeting. He leads where we'll go. He always has. You don't have to go Clave's way just because Clave says so . . ."

The motor stayed off.

The tree moved ponderously west and in. Its westward motion slowed over several days. The days were shorter, and Voy had come nearer. The smallest children learned never to look directly at Voy; but Rather could tell. In the corner of his eye the violet-white pinpoint was more intense, closer and *smaller*, with

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less sky to blur and distort it.

It took six days to make a sleep; then seven. Time whirled around them until they stopped caring. The journey had become more important than their destination.

The crew lived on the bark, all but Jeffer. They found the carm too strange. Even Rather left the carm after a few sleeps. He had learned that he liked strangeness; but he sensed that Jeffer saw him as an intruder. *The Scientist captains the carm.*

Debby and Booce disappeared down the trunk to monitor the progress of the bugs. They returned with smoked dumbo meat and two cured skins, which Booce shaped into armor that looked remarkably like the silver suit. "We won't use it this trip, but it's standard gear. The Navy will expect us to have it."

A grove of integral tree sproutlings passed Voy-ward of the tree, the first the citizens had ever seen. They were a few scores of meters long, tufted only at the out end. "The seeds drop away, out and in," Booce told them. "After they sprout, they have to sail back to the median. They'll grow the other tuft when there's enough to feed them."

The day came when Carlot called her father and pointed outward. "Isn't that a pod grove?"

Backlit by the sun, the cluster might almost have been a miniature tree grove hundreds of klomters out. "Small . . . yes. Too far, though."

"Why?" Debby asked.

"Well, it'd take too long to . . . I'd forgotten the carm. Let's ask Jeffer."

Jeffer summoned up his windows-within-windows. "Sure, we can get there. Clave, want to take a trip?"

"Can we find our way back? The tree looks big when you're tied to it, but from six hundred klomters away—"

"Trust me."

Forty plants grew in a loose cluster, all much alike. From a fibrous cup that faced west, a long, limp leaf trailed eastward, waving sluggishly in the wind. A thick vine reached a hundred meters out from the boll, ending in a kind of collar. Each collar held a brown egg-shape.

"Those are jet pods," Debby realized suddenly. "We used to ride them in Carther States."

Booce directed Rather to one of the largest plants. Carlot and Debby hung back. Rather the Silver Man circled the pod, cautious in the face of a new thing: a fibrous brown egg as big as the common room in his father's hut. There was tide enough to pull the vine taut. Smaller pods grew in a spiral around the stem end, ranging from fist-sized to man-sized. Replacements, he surmised, that would grow after the ripe one dropped away.

Satisfied, Rather wrapped his legs around the stem for leverage and swung his machet.

The sound blasted his whole body. The sky spun round him. Tide was pulling him apart. His fingers and toes felt like they were inflating as spin pulled blood into them.

Against the tide that was pulling him rigid, Rather forced his legs vertical to his torso, pulled an arm against his chest, and fired the ankle jets. The spinning sky slowed. He aimed his feet against the spin and brought it to a stop.

Battered and deafened, he pulled his

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helmet open to hear what Booce was shouting at him.

"That one was ripe! Try another plant!"

Rather jetted toward the grove. Booce guided him from a distance. "No, that one's stunted. We want a big one."

"Aren't the big ones likely to be riper?"

"That's why we use armor! Try there—"

The pod exploded, blowing him west and away, while seeds *spanged* off the silver suit. The spin was less this time; the blow had been more direct. Rather opened his helmet. "I think I had more fun on the tree!"

"It's too wet here. The pods like to spread their seeds when there's water around. Try that one. Close your helmet!"

Rather seriously considered telling the alien merchant to go feed himself to the tree. But he was already moving toward a third vine. *There isn't any other Silver Man,* he thought. He swung viciously at the base of the pod. *And what am I, if I'm not the Silver Man?*

The pod dropped out and away. Carlot and Debby flapped after it.

The next one didn't explode either. Rather chased the seed pod down, with Booce chasing him. They braced their shoulders against the pod and started back. They were near the carm when Rather's jets died.

He fiddled with the throttle wheels. Nothing.

"Booce! Don't leave me!"

"What's wrong?"

"The suit won't move!"

Booce laughed. "Are we going to have to put wings on that thing?"

"Can you push me—"

"Can and will. Here comes Debby. I'll push you and the ladies can have the pods." Booce seemed indecently cheerful, and Rather was a long time understanding why.

Booce had found a flaw in Citizens Tree's intimidating science.

"You ran out of fuel, that's all," Jeffer told him. "See that little red light below your chin?"

"It was on when I started out. I don't know what it means."

"Means you're out of hydrogen. There must be a way to refuel the suit. I'll search the cassettes. If I can't find anything we'll have to ask Mark, after this is all over. Calm, now! We've got pods and we've got honey. Maybe we won't need the silver suit again."

A forty-klomter-long tree is hard to lose from six hundred klomters away. Jeffer had no trouble bringing them home.

Booce attacked the first pod gingerly, hacking at the stem with the machet, flinching back at each blow. At the sixth blow the pod suddenly spewed foggy air under terrific pressure. Booce threw himself into the sky. He flapped back, staying well clear.

He opened the other pod in the same cautious fashion. Then he and Carlot sawed it in half. The inside was lined with fist-sized puffballs, each with a dangling tendril. Booce scraped these away.

He sawed the stem off the first pod, leaving a small hole. He shaved the edges until the hole was just smaller than the metal pipe, and quit for dinner.

They resumed work after breakfast. It took four of them to shove the ends of the pipe into the holes in both pods.

Clave asked, "Now how do you get

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water in there?"

"Punch a little hole in the other end of the tank. Put the pipe in a pond and suck. You need good lungs to be a logger."

"We're too far in to find many ponds."

"I know. Usually we fuel *Logbearer* before we go to work on the tree. But, dammit, we've got the carm, and there'll be a pond somewhere, and *Logbearer* is whole again! Except for the lines. And cabins. We'll need wood to build cabins."

"We'll go for wood after the next sleep," Jeffer said. "The out branch, I think. The in branch may be about to fall off."

"No. Another thirty days at least."

Carlot said, "Father—"

"Don't trust that," Booce said instantly. "We'll use the out branch."

"You're the logger. What changed your mind?"

Booce sighed. "I was guessing. I don't *really* know when the in branch will fall off. Jeffer, there's likely to be a shock when the branch tears loose. Stay aboard the carm. Stay strapped in when you sleep. Leave the motor off."

"Stet. Will the rest of you be okay on the trunk?"

"As long as we keep our wings handy. Always have your wings in reach . . . always. But you should be in the carm in case we need rescue."

The steam rocket still required attention. Booce and Carlot festooned the water tank with lines and wove a braid of lines around the bow end. "We'll moor the cabins here. Other than that . . . I still don't know what we're going to use for sikenwire. There has to be some way to hold the coals in place."

Clave had a suggestion. "We could arrive crippled. Get a push from the carm to drift the log into range, then signal for help somehow. Tell the Navy we lost our sikenwire, got home by luck."

"Mmm . . . maybe. I'd look like a fool, but maybe. I just don't want to be in too much of a hurry." He stopped abruptly. Then he said, "Ryllin and the girls, they—*we* were in a hurry to get back to the Admiralty. We started the rocket running before the tuft dropped off."

"What's—?"

"Did I tell you you're rich?"

"I don't know what it means," Clave said.

"That wart on the trunk is thousands of kilos of metal. With metal you can buy anything that's for sale in the Market. It also makes us a target. Someone might try to steal it."

"Good news and bad news."

"Right. We'll set up shop to sell the wood, and take our time selling the metal. No hurry."

Food had grown short again. Debby and Clave flew in along the trunk until they found a covey of flashers. With the trunk as a backstop they fired their full complement of arrows and shot half a dozen of the small birds. The trip took six days.

They built a fire on the trunk to cook the birds. *Logbearer*'s crew was ready for a feast.

Booce was the exception. He ate little. He was uncharacteristically silent, his eyes on the fire, until Carlot said, "Dad? Twenty-five days?"

"About that," Booce said. Then, "I guessed last time. I should be in the tuft watching the bugs."

"Dad, you couldn't warn us from

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down there anyway."

"I could start climbing ten or fifteen days early—"

"Dad—"

"I'm glad we don't have the rocket running. We were running the rocket when it happened."

The silence stretched. Debby asked, "What happened?"

Booce told it.

Booce was fast asleep when the cabin's yielding wooden wall slammed into his face and chest. His grunt of surprise was lost among feminine shrieks. He was reaching for his wings before his eyes were fully open.

The women were a flurry of action around him, snatching for their wings, moving out. Ryllin reached the door, looked about her, then immediately turned toward a violet-white glare that hadn't been there when they'd gone to sleep. Carlot and Karilly followed. Wend hadn't found her wings. She was near tears as she searched.

Booce left her. Nothing terrible could happen to Wend aboard *Logbearer*, and this would teach her *always* to know where her wings were.

He saw it all at a glance:

Logbearer was moored against a vast wall of bark, the east side of the trunk. Coals in their retaining net burned bright orange along the middle length of the pipe. The nozzle cone pointed east toward the Clump. Some meters from the cone, live steam condensed into a white stream klomters long.

The Clump was a distant whorl of white-and-gray storm, with the misty white tube of the Smoke Ring converging beyond and below it. The eye might follow that white line down the sky . . . and where the tree converged to a point, there was Voy.

The glare-white pinpoint had been masked by the in tuft when Booce went to sleep. The in tuft was gone. It had torn loose days before Booce expected it. Freed from its weight, the tree had lurched outward. Booce had guessed as much; now he could see it.

In toward Voy, a fluttering black silhouette was haloed in blue light.

Mishael had been outside on watch. The lurch had torn her loose. She was far in along the trunk, flapping out-and-east to bring her out, just as she'd been taught. But he'd never taught her to lose one of her wings!

Ryllin and the girls flew toward her: foreshortened black silhouettes. They made slow progress. In-and-west would have taken them straight in, but the west was a wall of black bark.

Booce followed slowly. Mishael seemed to have it under control.

With the in tuft gone the center of mass was higher on the tree. Tide was pulling Booce away from the tree, and in. A new breeze announced that the tree was under sail, accelerated by the wind on the out tuft. He kick-flapped to adjust. Ryllin and the girls had nearly reached Mishael. Karilly looked up, and flapped to turn. She was shouting at him. The wind tore her voice away. He tried to hear. She kicked toward him, screaming—

Booce turned toward *Logbearer*, too late.

The lurch and the breeze and Booce's inattention, these had caused the disaster. A flurry of coals had been jarred loose from the sikenwire cage. Irradi-

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ated by the pipefire, the bark had been drying and warming for tens of days. It had been ready to ignite.

Under normal circumstances an integral tree is in equilibrium with the wind. A steady gale blows at each tuft, and no wind blows at its center. Air must move past a fire to keep it burning. But a tree under sail is moving, and there is wind. Coals reached the bark and blazed up.

Booce flapped hard toward a *Logbearer* already embedded in flame.

He hadn't panicked then. There was a hose, and pressure in the water tank, for the fire would be heating it. He would use the hose to spray water and steam on the fire. Booce breathed deeply as he flew, hyperoxygenating. He'd hold his breath while he worked. The danger was that he might breathe flame.

Wend crawled gingerly through the cabin door. Her feet were wingless, her eyes and mouth wide in terror. She saw Booce, gathered herself, and leapt toward him, into the sky.

The water tank ruptured.

Booce saw Wend blown outward in a wind of live steam laced with boiling water. He flapped to catch her, hearing his own howl. She was flying past him. He stretched impossibly, and caught her bare ankle, and felt the scaled skin slide loose beneath his hand.

There were comforting hands on Booce, on his shoulders and arm and ankle, for touching was the way of Citizens Tree. Rather hung back, uncertain, reluctant to take such liberties. Booce was a mature adult.

Where was Carlot?

Booce was hoarse, for he had been shouting, howling; but he sounded almost calm now. "Everything's blurred after that . . . Lawri the Scientist was feeding me foliage and I couldn't remember anything. It all came back a bit at a time."

Rather eased away from the cookfire and flew toward Voy. Behind him Booce was speaking mostly to Debby, who was rubbing his temples.

"It never happened before . . . not to us. Sometimes a logging concern just disappears. We wonder why. We never find out. For Ryllin, for the girls, I should give it up. But logging's all I know—"

The memories must have been too much for Carlot. If she wanted to hide . . . a crack in the bark? Bark walls would muffle the agony in her father's voice. She might have gone in any direction . . . but the cracks ran out and in. Try *in*.

Rather coasted above the bark. He didn't mind being seen. She'd have kept going until she couldn't hear the words.

"Go away."

He somersaulted and kicked air to stop himself. "Carlot?"

No answer. It had come from his left, from the north. There: scarlet showed in a crack. He said, "I wouldn't have found you if you'd kept your mouth shut."

She was pulled into herself, like the shellbirds around the ice-pond. Her wings were on her back. He fluttered into the crack beside her, but didn't touch her. "It must have been bad."

"It was bad."

He tried again. "Want a hug?"

"I want Wend back."

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"You have to learn to think of her as a lost one."

"She was fifteen!"

("She wasn't even two!" Jill had wailed after a sister sickened and died. Ilsa had hugged her daughter frequently. When Ilsa died at thirty-one it had been no better for Jill.)

(Age didn't matter. Touching helped.)

Rather worked his fingers into her hair and began a scalp massage. She didn't move. He said, "I've had brothers and sisters die. We all have. You forget."

She'd removed her sleeves after the fluff died. The skin of her arms was smooth and richly dark, and she suddenly wriggled about and had him in a deathgrip.

Rotating, they drifted in the sky. Rather still wore his wings; his instincts told him to return to the tree. He held her.

She wasn't sobbing. Presently she pulled her chin off his shoulder and kissed him.

He asked, "Better?"

"Yes. I don't want to go back."

"Will you be all right here? Shall I stay?" Half a dozen finger cactus drifted east, less than a klomter distant. A wind-borne finger cactus could be lethal. These were only drifting, and drifting away at that . . . but you never stopped *looking* for danger.

Carlot hadn't answered. He said, "Your father might get upset if we stay here too long—"

"Father's made mistakes before."

"He tells you who to make babies with, though. Mishael had to ask, and she's older than you."

"Do you want to go?"

". . . No."

"I thought hard before I took my clothes off in front of you."

He remembered swimming in the waterfall, and laughed. "I noticed. But Booce was there."

She freed him, and all the muscles in his body jumped. *Loose in the sky!* But he had wings. Carlot drifted, rotating away from him . . . donning her wings? No: she pulled her tunic over her head, then rolled her pants off and balled them up together.

He looked. *Now* she was tying her wings to her ankles. Her clothes too. Nudity was not strange to him, but this was different. Carlot was long, one and a half times his own height. Her breasts were perfect cones, an abrupt break in the long smooth stretch of her torso. Rather resisted the urge to touch her. He spoke hurriedly, before he could lose that fight. "Now, what would happen if we really did make a baby? Could you still marry anyone you want to?"

She said, "It's all right. We just have to watch what time we do this."

"Yeah?" Rather had never heard anything about how *not* to make a baby. "When can you do it?"

"Now."

"I've never done this before." He swam toward her.

"I'll show you. Take these off."

Chapter Ten: Secrets

From the Citizens Tree cassettes, year 31 SM

FISHER PLANT is boll-shaped, 100–300 meters in diameter. It can extend a long water-inflated root into a passing pond, for fertilizer as well as water.

FISHER JUNGLE may be consid-

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ered a large (400–700 meters) fisher plant with a sting. May attack big birds as well as ponds. Prey are brought into the jungle to rot.

FINGER CACTUS—The newly budded form looks a little like a green potato, with eyes. Fingers sprout from the eyes, and branch and re-branch, until an adult in flower may bear 20–30 fingers. Each finger is tipped with a spine. Any creature that comes too near may be speared; and then roots grow into the victim. Later in life, fingers bud new finger cactus. *Dangerous.*

Rather woke because his eyes burned.

They were filled with tears. Blinking did no good. The tears were under his eyelids, filling them. The pain had him whimpering. He tried lifting his eyelids with his fingertips to let the water out. That hurt. Mopping his eyes with his tunic brought agony. He couldn't see!

"Carlot?" He remembered that she wasn't with him. They had not returned to the cookfire until all were asleep except Debby, on watch. She had winked at them . . . they had separated . . .

Sleep, then daggers in the eyes. He would not have wanted Carlot to see him like this. But he was alone, and blind!

"Clave? Debby? Anyone?"

Rather could feel bark surrounding him. Yell again? He'd yelled when the silver suit's jets gave out. The memory embarrassed him. He'd had gritty eyes before, when he was tired . . . but not like this! "Someone help me! I can't see!"

"Rather?"

"Debby? My eyes are on fire and I don't know why!"

Her hands were cool and rough on his cheeks. "Open them."

"I can't—" He got them open, just a slit for just a moment. The light was agony.

"They're bright red. I'll get Clave. Don't loose your tether."

"No way!"

The pain grew no worse and no better. It was a long time before he heard voices.

"Rather?"

"Clave! What's wrong with me?"

Long fingers held his head still; thumbs lifted his eyelids. "You're not blind. You're not dying either. It's an allergy attack. Your father used to get this way when Dalton-Quinn Tree was dying of the drought. We were too far in toward Voy. Dry, thin air and not enough sleep."

"What do I do?"

"Gavving mostly suffered. In half a day he'd be over it. Don't rub your eyes. Let me think."

It seemed to hurt less now that he knew it would go away. It hadn't killed Gavving. And if they both had the same allergy, then—*He's really my father! I should tell him! Mother too . . . and Mark?* But the pain was more urgent. "Clave, if this happens when I don't sleep, and I can't sleep because it hurts too much . . . Clave?"

His line went slack. "I've thought of something. Just relax. I'll tow you."

"Kendy for the State—"

"Kendy? Treefodder! It's been a long time."

"That's not my fault, Jeffer. Every time our orbits have matched, there has

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been someone else in the carm. Where are they now? I don't find them outside either."

"They're asleep. I was too. Everyone but me sleeps on the bark. Kendy, how do I refuel the silver suit?"

Diagrams appeared: carm and silver suit, side by side. Parts of the schematics blinked blue as Kendy talked. Jeffer saw that tanks along the calves of the silver suit were what made the legs so bulky. "Hydrogen here, oxygen here. There's hose under these little panels. The spigots are recessed, here and here, under these covers on the hull. You open them from the control panel. Bring up the schematic, then twist above these dots, this way." An arrowhead circled.

"Good."

"Remember. Oxygen line from here to here. Hydrogen from here to here. Getting it wrong may cause an explosion."

"What keeps the gases cold?"

"In a pressure suit? No, the gases are just under pressure. That's why the tanks go dry so fast." Kendy's face was back in the bow window. "Did you find six metric tons of metal ore?"

"Yes. Thanks. Booce says it makes us rich."

"Good. I see you've been building a steam rocket. Is it finished?"

"Booce still has to build cabins. We'll go to the out branch for the wood. He still doesn't know how to hold the pipefire—"

"Here's the carm," a voice said. "Feel the airlock walls? *Treefodder!*"

Clave was in the airlock with Rather behind him. The display went blank, a breath too late.

Clave got his mouth closed. "First things first. Scientist, Rather's having an allergy attack. You remember how Gavving was during the drought? Rather, you need thick wet air. So, we'll close the airlock and turn up the pressure and humi . . . um, wetness. Do it, Jeffer."

Jeffer let his fingers dance. Close both doors, humidity up, pressure up. Pressure in his ears. He worked his jaw. He untethered himself and moved aft.

Rather's eyelids were puffy; the eyes were scarlet. Jeffer said, "It goes away after awhile no matter what you do. This might help. Or not. Work your jaw to pop your ears." He turned to Clave. "Well?"

"How long has the checker been back?"

"Since the Serjents reached the trunk."

"Why didn't you tell someone? *Me!*"

"Let's go outside."

He opened the inner airlock door, and gestured Clave in. From the look of him Clave might explode any minute; but he came. They were nose to nose while the inner door closed and the outer opened.

"Keeps the pressure in," Jeffer said. "That's why it's called air-lock." He kicked out into the sky.

Clave followed on mismatched wings. "You're stalling."

"No. Kendy can't reach us except when the sun is dead east, but anything that goes on in the carm, Kendy hears it later. He can't hear us now."

"He wouldn't have heard us in the Citizens Tree commons!"

"Yeah. Clave, the truth is that I didn't trust anyone else to talk to Kendy. I don't trust Kendy, and he's very persuasive."

"Am I too fluff-brained to say no?"

"Clave . . . all right, so I was arrogant and wrongheaded. Now let's go tell the Serjents."

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"Uh—"

"Hey, citizumf!" It wasn't really a shout, but Clave's long fingers closed over Jeffer's face. After a moment the palm lifted to expose an evil grin.

Clave said, "You still should have told *me*. Rather didn't see anything. Did you tell Lawri?"

"No."

"What does Kendy want?"

"He wants the Clump. He wants to know *everything* about the Clump."

"This trip was his idea, wasn't it."

"I told you he's persuasive. Clave, we have to tell Rather about this before he talks to anyone. He already knows too much. Nobody else, right?"

"Right. Then I want to talk to Kendy."

"He comes in range every seven days lately. Seven days from now, when the sun is dead east."

Jeffer found Rather in the Scientist's seat, hands poised above the controls. "Freeze," he said. "Now move away."

Rather obeyed. "I was trying to open the airlock."

"Use the little lights on the doors. Rather, any citizen knows better than to fiddle with the controls. Once I nearly killed us all with one ill-considered tap of one finger. But I don't have to explain that to you. I only have to say, Jeffer captains the carm, keep your treefeeding hands off the controls. Stet?"

"Stet. Sorry, Jeffer. I've seen you open the doors, and I was feeling shut in."

"How are your eyes?"

"Okay."

He held still while Jeffer looked. Rather's eyes were pink and the lids were puffy, but he didn't blink. "From now on you sleep in the carm with me. I should have someone here anyway in case we get shaken up when the tuft tears loose."

Rather had already summoned the blue diagram of the carm's cabin. Jeffer opened his fingers over the lines that represented the airlock. The doors opened behind him. He said, "Help me get the hose linked up. Then take it outside."

Booce met them at the door. "I'll take that, Rather. We're filling the rocket. How are you doing?"

"Better."

Debby, Clave, and Carlot waited at the rocket. Booce and Rather crawled along the bark, dragging the hose after them. Booce spoke quietly. "Did you know that Carlot was a crossyear child?"

"No. What's it mean? The crossyear is when Voy crosses the sun—"

"Children born at the crossyear are unpredictable. They can go any way at all. Rather, I'm trying to tell you that you and Carlot are not to marry. She'll marry a logger."

Rather didn't answer. Carlot's expression was unreadable until the moment Booce's back was turned. Then she winked. Rather felt his face glowing.

To work. Booce forced the hose into the rocket nozzle. "Jeffer says he can fill it without anyone sucking on the end. Clave, give us a hand here. Now push. *Jeffer! Ready!*"

The three were braced to hold the hose in place. Clave said, "There's a signal Jeffer uses that tells the carm to push what's in the water tank back out. It gets rid of mud—"

The hose writhed. Water sprayed out around the joint. Rather could feel the power of the water trying to tear the

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hose out of his hands.

They held it, held it . . . and suddenly the hose bucked loose and thrashed like a live thing. Rather dodged and was flailing in the sky. Booce bellowed, "Enough! Jeffer, it's full!"

They were soaked before the hose went limp. Jeffer called cheerily from the airlock. "When do we see a test?"

Booce looked embarrassed. "I still don't know how to substitute for the sikenwire. We've got time—"

"Yeah. Well, we've used up too much water, one way and another. I want to refuel the carm. Clave, Rather, come along. We won't be long, Booce. The rest of you can start dinner."

The three of them returned to the carm. Clave asked, "What do we do for a pump?"

Jeffer was smiling. "I've thought of something. There's a pond thirty klomters out and a little east . . ."

The sun wasn't much past zenith. A pinpoint diamond blazed next to it, out and a bit west: sunlight focused through a pond. Jeffer set the carm moving straight out.

The out tuft ran at them and past them. The pond wasn't far beyond, and not much bigger than the carm. Jeffer set the forward jets firing when they were close. They came to a stop just in from the water globule.

Jeffer opened the airlock. He told Rather, "Get into your wings and follow us. Bring the silver suit. We'll refuel the jets."

Jeffer led them outside and around to the carm's dorsal surface. Rather followed, tugging the silver suit by its limp wrist. There Jeffer took the suit from him. He watched as Jeffer produced narrow hoses from under a hatch. . . .

Clave said, "Forget the suit for awhile. Let Jeffer do it. Rather, you missed something during the allergy attack. What do you think happened then?"

"All I know is, you caught Jeffer at something."

Jeffer grunted. He had the hoses hooked to holes in the suit's legs.

Clave said, "You missed your chance to see Sharls Davis Kendy. You'll get it again in, what, half a day?"

Jeffer looked at the sun: past two o'clock, a few degrees out from west. "A little more than that. The thing is, this is a secret, Rather."

"Everybody's got secrets. . . . Kendy? The Checker?"

"Tell him, Jeffer."

Jeffer said, "Kendy's back. He pointed out the Wart for us. He talked to me the day we rescued the Serjents. We've talked since. I gather it costs him something, maybe shortens his life, and he still can't reach us more than once every several days."

Rather said, "The tales Mark and Gavving tell, Kendy would have killed you all if he'd known you stole the carm."

"I don't think he could have done that," Jeffer said, "but he might have wanted to. We stole the carm to get away from London Tree. We had Lawri tied to her seat, and Mark the Silver Man too. Kendy might have called it mutiny. You know some of this."

Rather said, "You were copsiks. They owned you. I never understood how you could live with Lawri and Mark after that."

Clave said, "What were we supposed to do, throw them into the sky? They

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earned their citizenship, Rather. When the air was leaking out of the carm, Lawri found the way to plug the leak. When Kendy was asking questions, Mark covered for us. We could have told Kendy we were escaped copsiks, but I'm not sure how he would have felt about that. Maybe Kendy's people kept copsiks."

"Kendy."

"Yeah. He—Scientist, you understand this better than I do."

Jeffer said, "Give me a minute." He was moving the hoses. "Need to refuel the legs one at a time. . . ."

"Stet. Now, Sharls Davis Kendy claims to be the recording of a man. I don't understand that. Neither does Lawri. We don't even know how cassettes work, really. I wondered if he was just some madman who reached the old starship, like we almost did, and was living aboard. But it's been fourteen years and he doesn't sound any older. He wanted to know all about us. Whether we were mutineers. Well, treefodder, we *did* steal the carm, we *were* mutineers, much as I hate the word."

"That's all in the past," Clave said.

"Yeah. Now he wants to see the Clump. Clave, remember how he talked fourteen years ago? I think he still wants everyone in the Smoke Ring to be one big happy tribe taking orders from Sharls Davis Kendy."

The dark pond blazed at its eastern edge. Rather wondered if there would be time for a swim. He was not comfortable in this maze of secrets. "Kendy isn't the Chairman. We don't have to do what he says."

"No."

"Well, we want to see the Clump too. And if he can't touch us—Why not tell the Serjents?"

"Boy's got a point," Clave said.

"You didn't tell them either."

"Maybe that was just reflex."

"Just talk to Kendy, Chairman, and then I'll point out something."

Clave merely nodded. To Rather he said, "One more thing. Kendy hears everything anyone says aboard the carm."

Rather laughed.

Jeffer asked, "Anything else to discuss? I think I'm finished here. Now let's refuel the carm. Go back in and strap down."

"We still don't have a pump."

The Scientist's answering grin was a little mad. Clave sighed.

Jets grumbled, then died. Rather watched a wind-riffled wall of water move toward the bow window.

Clave asked, "Shouldn't you close the doors?"

Jeffer grinned and shook his head.

Clave said, "I wish to point out, *Captain*, that we're going to hit that pond."

"Yeah."

The pondlet struck. Rather sagged in his straps. Clave grunted. He asked, "Do you honestly know what you're doing?"

"I honestly do."

Through the great window the interior of the pondlet was open to view. A flock of tiny silver torpedoes sped away through the murk and disappeared through the shivering silver surface.

"The carm's hundreds of years old and nothing's hurt it yet. Now I reduce the interior pressure." Jeffer's fingers moved; the air system hissed; water en-

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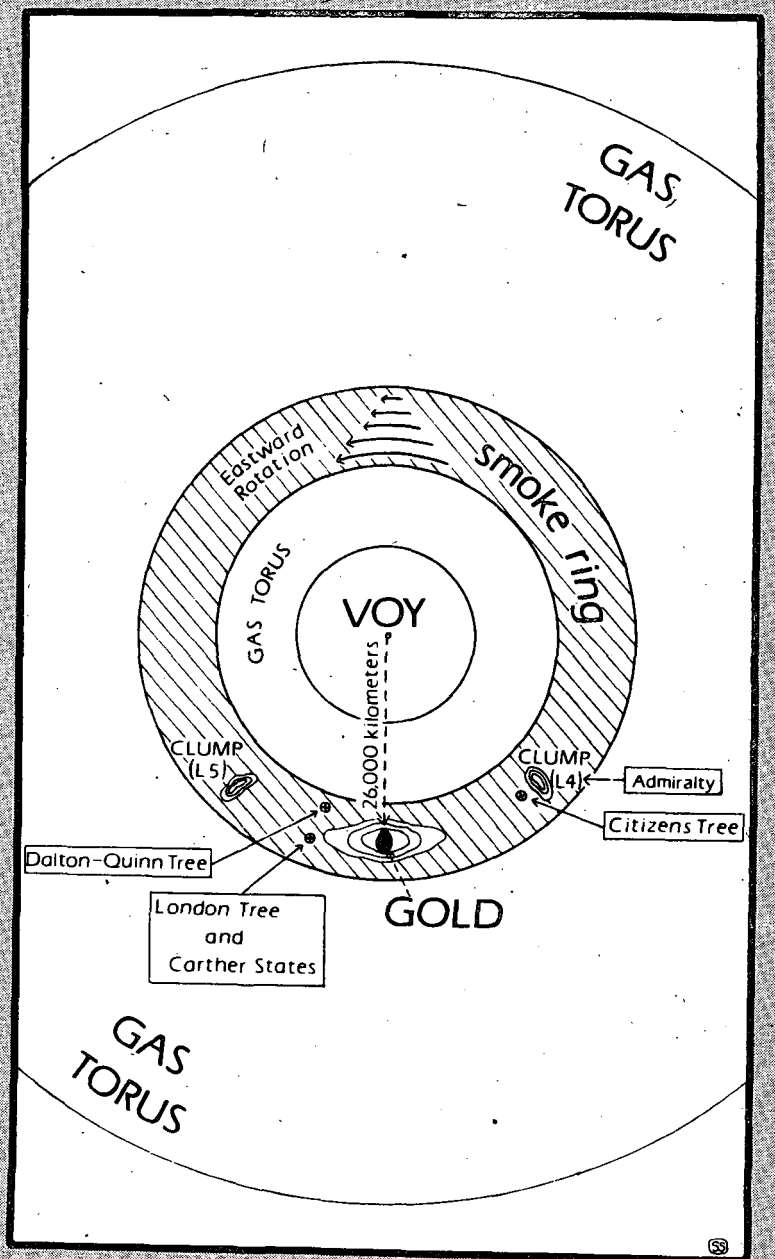

Diagram by Shelly Shapiro

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tered the airlock in an expanding silver bubble.

The doors closed. Water remained inside, flowing over the aft walls, the curve of it becoming more and more concave. Waves curled and sloshed as Jeffer turned the carm away from the pond.

He grinned at them. "Now I set the pressure back to normal and turn down the humidity. That tells the carm to make the air dry by taking water out of it. The water goes to the tank. See? We can't run out of fuel now. It's something Lawri never thought of."

"It's treefeeding *wet* in here, Scientist!"

"But you don't have to pump. Next on the agenda is Kendy. Checker, when you hear this, please introduce yourself."

Clave asked, "What if he's not there?"

"He'll hear it when he runs the record—"

There was a face in the bow window.

Kendy was a dwarf. Rather had expected that, but he was still taken aback. Deep-set eyes examined him, judged him, within a face like carved rock. A giant's gravelly voice said, "Kendy for the State. Hello, Chairman Clave. Hello, Rather the Silver Man. Scientist, your manner of refueling the CARM is likely to destroy it. If the impact had torn away the solar cell arrays, how would you break up water? A carm doesn't fly on water."

Jeffer looked nettled. Clave said, "Welcome back, Kendy."

"Thank you, Chairman."

"Why did you hide from me?"

"I felt that Jeffer was better equipped to judge his political situation than I."

Clave bridled. "And I'm not?"

"If Jeffer had told you, he would surely have had to tell his wife. Do you trust Lawri's judgment?"

"I give up. Between you, you . . . stet."

"I watched your non-mutiny with some interest. You're a natural leader, Clave. You should be ruling many more than your thirteen citizens."

"Thank you, Checker. Where do you propose I find another thousand citizens, all of whom are inclined to trust a tree-living outsider?"

The language was cold and stiff. Jeffer and Clave did not trust Kendy, and Kendy clearly knew it. He said, "You need not turn a compliment into a policy statement, Clave. I can't force you to obey my orders. You can't stop me from observing through the carm's instruments. You know that I know things you do not. Can't we work together?"

"Maybe. Thanks for the showing us the Wart."

"You're welcome. Has Booce found a way to confine the pipefire?"

"Not yet."

"Even with sikenwire, the pipefire is dangerous. You do have a source of metal. You can make a firebox from the Wart."

Clave grinned. "What a good idea."

"You probably don't have the facilities to make a smelter—"

"What?"

"A smelter refines metal. It melts metal ore and burns away impurities. You shape the metal by pouring the liquid into forms. Gravity is needed, or tide, or spin. The Admiralty may have such technology, but I gather you do not."

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"We do not. You'd set the tree on fire for sure!"

"But you do have a saw. It was moored in the cargo section. Use it to cut slices from the Wart."

"Kendy, you'd ruin the teeth."

"No. That saw was taken from *Discipline*. Most of the tools aboard *Discipline* were made to last. Even with trivial items, the major cost was transportation. The chicken wire must have been made in the Admiralty, but your hose is reinforced with hullmetal alloy. The pipe is hullmetal. So is the saw. You won't damage it by sawing slices from a mass of soft iron. Here—"

Kendy's angular visage was replaced by a line drawing of the steam rocket, then another line drawing: a rectangle with tabs at its edges. "Cut three of these. Use the first as a template—"

"How do we hold the parts together? Tethers would burn."

"Set the plates in place and pound on the tabs until they bend down. They'll fold over each other." Three rectangular plates formed a triangular prism. The tabs along the edges blinked green, then bent themselves over to interlock. *Logbearer* reappeared, and the three-sided box now enclosed the pipe and pipefire.

Clave said, "I'll ask Booce. You won't get much air flow to the coals."

"Mount the rocket two or three kilometers in or out from the center of mass. The wind will keep the coals alight. You couldn't make a completely closed box anyway. *It will leak.*"

"Mmm . . . yeah. You've been thinking hard about this."

"I can solve simple mechanical problems. What will you do with the carm when you reach the Clump?"

Clave was still studying the diagram. "We'll hide it before we get there. Take the log in with the steam rocket. Take our time selling it."

"You'll want to keep the carm safe, but near enough for rescue if something goes wrong. Now, the Clump is more crowded than the Smoke Ring in general, but one may still think of it as mostly empty space. Two thousand people won't crowd a region the volume of the Earth's Moon! You'll find plenty of hiding space."

"Kendy, we can't steer the carm into the Clump and just look around! We'd be seen!"

"I have a better view of the Clump than you do, even if it's not a good view. If you approached from north or south of the Clump—"

"What we'll do is take the log in, then look around while we're selling the wood. If we find a safe way in, we'll take it."

"Another thing you might consider," Kendy said. "The carm is power. There may come a time when we'll want to use that power—" Kendy's voice and picture faded.

"Well, that's that." Jeffer left his seat. He stretched elaborately. "Let's go out. Take some spears. We'll get us some waterbirds before we turn back."

They moved out. Clave said, "Well?"

"*Now* do you see what I mean? He wants the carm inside the Clump. He wants it bad. If he can get some Admiralty citizens into the carm, he could look them over and question them."

"He didn't say anything unreasonable," Clave said.

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"Persuasive, isn't he? All right, think about this. There occurred an accident that allowed Chairman Clave to see the Checker talking to the Scientist. That happened *after* Kendy was sure he couldn't talk *me* into this."

Clave smiled. "An interesting coincidence. The carm has outside cameras, doesn't it?"

"Yeah. And Booce would like to be *rich* so that he can give up logging. Do you think Kendy could persuade Booce to trade the carm to the Navy for metal?"

The smile slipped. "We'll do it your way. Rather, this stops with us. All of it. Now shall we get us some waterbirds?"

"I said that to get us outside," Jeffer said.

"Let's do it anyway."

Chapter Eleven: Happyfeet

From the Admiralty Library:

Year 131, Day 160. Voice has set us the task of integrating the deserters—excuse me, *wanderers*—into the Admiralty. It will certainly take generations. Exec Willoughby admits that it may be impossible, and I've come to agree.

Half a dozen cotton candy jungles now trade regularly in the Clump, meeting at the crossyear. They obey Admiralty law, where Admiralty Navy is present to enforce it. Outside the Clump there is piracy and slave-taking. We believe that the Seekers and the Lupoff family were involved in such incidents, though they were the first to trade in the Market.

We cannot bring law to thirty Earth-volumes of inhabitable territory. The Smoke Ring is too huge, and we are too few and too slow.

—Lieutenant Rand Carster

Brilliant as it was, the neutron star was too small to give much illumination. Yet the sky was never dark, even at crossyear, when the sun at nadir had to shine through the full thickness of the Smoke Ring's further arc. One must seek darkness in a cloud or a jungle or a tree tuft, or in the unoccupied depths of the Clump.

Now the sun was dead east, somewhere behind the slowly roiling blotch that was their destination. It was gloomy in the shadow of the Clump. Masses near the white-fringed black mass seemed to blaze in contrast.

"We're better than halfway home," Booce said. "Debby, I've been looking for more pod plants. The last thing I ever wanted was to come home with a pod for my cabin, but we don't have time to build real cabins."

"The rocket's finished otherwise?"

"Yes."

"Good." Debby had been working hard. Her tunic was off and her pale skin glistened with sweat. "Now, how do we make it work?"

"Trade secret."

Debby regarded Booce angrily. "We built the treefeeding thing. You won't tell us how to make it go?"

"Classified, Debby."

"Will you tell us how to make it stop? In an emergency, if you and Carlot aren't in reach, how do I stop it from just burning up?"

"We'll get an extra pod and fill it with water to pour on the pipefire—"

"Very *good!* Now, suppose you and

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Carlot both fall off the tree and lose your wings and we've got to come after you. Suppose you left the rocket going. What do I want to do?"

Booce found her persistence disturbing. "Use the carm, I suppose—"

"The carm is gone."

"They're only refueling it."

"It could be gone again!"

"Then use your wings. *Don't* try to use the rocket. That's dangerous."

Debby glared and was silent. She was Booce's height and almost Booce's age, marked by a dangerous and exotic beauty. Pale brown skin, pale straight hair, fiery blue eyes; a face all planes and angles, with a nose like an axe head. She was the type of woman who would remake a man, who would run his life for him. As Ryllin was. And Ryllin was far away . . . and if Booce carried that thought further, Ryllin would know somehow, and Booce would regret it greatly. Booce looked at the sky to escape Debby's eyes.

He'd been watching the sky for days now. They were closing on the Clump. Matter would be thicker here, even this far in: more ponds, plant life, animals, predators, perhaps Navy craft or wandering happyfeet.

West of out, almost behind the log's remaining tuft, he found paired bright and dark dots: the pond and the carm. No sign of pod plants. Would they have to cut wood from the out branch after all? Branchwood was better . . . but it was hard work, and the cabins would be crude. This time let someone else demonstrate his muscles.

Debby was still fuming. "You know, arguing isn't the thing I do best. But Clave is going to have this out of you, because it's *stupid* not to tell us how to use the basic logger's tool. Won't the Admiralty expect us to know—?"

"No. You're hired labor."

"Right. I forgot."

The days went fast this close to Voy: nine days between waking and waking. North and west, the reddish fringe of the Clump's shadow was sliding rapidly down a tremendous wall of cloud. Storm and lightning inside, and ponds forming . . . The line of sunlight picked out a green dot, a drifting jungle emerging from the fringes of the storm.

Carlot suddenly asked, "Debby, should we know how to use the carm?"

"Yes. *Yes* we should know how to run the carm! Treefeeding fools they are, Lawri and Jeffer both."

Booce was jolted. "Debby? You can't fly the carm?"

"Nobody knows but the Scientists. *Classified*. Lawri I can understand. But Jeffer, he stole the thing himself, and now he acts just like her! Fifteen years, almost!"

"Dad? She's right. We should all of us know all of that, and we have to start somewhere."

Booce sighed. Crossyear child! Playing around with a dwarf treedweller . . . but the women always won the arguments. "Debby, as far as any Admiralty citizen is concerned, you know *nothing* about how a rocket works. Understand?"

"Yes, Logger Booce. Now, what is it you loggers have been concealing from us laborers?"

"Go ahead, Carlot."

Carlot considered before she spoke. "All right. Just the way you taught me. Debby, you'll have to imagine the sik-

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enwire in a tube around the pipe. I stuff firebark inside and light it."

Debby nodded.

"The coals are just along the middle of the pipe, not too close to the ends. I wait. I want the metal to get hot. It should glow red. Hotter than that, the nozzle starts to char. That's bad. So I run water through the pipe. The metal stays dark red, and steam comes out the nozzle. You can't see it where it comes out, but it can flay the flesh from your bones, so stay clear."

Her father smiled, nodding approval. He'd taught her well.

"Now, how do I move the water *into* the pipe?"

Debby mulled it. "No tide—"

"How do I keep outsiders from watching me do it?"

Debby brightened. She kicked herself to the fore end of the water tank. "I'm here, right? There's a cabin, and I'm in it. And here's the plug—"

"Just so!" Carlot joined her. "You pull the plug. You blow in it. When the water spurts back at you, you slam the plug in quick."

"I could get a lungful of water that way."

"Sure you could. We've all done our share of choking. Father taught us this so he wouldn't have to do it himself."

"Why does it blow back?"

"I . . . Dad?"

Booce said, "The steam pushes both ways. Out the nozzle, and backward too. That churns the water so more water comes down the pipe. After the rocket settles down, it's thrust that pulls the water through. The back-pressure holds it from going in too fast. You can let the rocket run till the water's almost gone."

Carlot said, "You've got to let the pipefire die before the tank's empty. Otherwise you'll char the nozzle and the tank both. It's a mess if you have to throw water on a pipefire."

The storm was definitely reaching out to enfold the tree . . . and the jungle was closer too. Booce pointed. "Carlot—"

Carlot looked. "Happyfeet?"

"Maybe. Debby, what have we got for weapons?"

"Harpoons. The rocket, I guess."

"Not enough. All right, ladies. Maybe it's just a loose jungle, and even if it's happyfeet they may not have noticed anything, but I think we should hide."

"*Hide?*" Debby was outraged. "Booce, that's not much of a jungle. Carther States was twenty times that size."

The jungle was closer now, a fuzzy green ellipsoid with a shadowy slit in it, as if foliage had been shorn away to form a window into the interior. Booce said, "A jungle that size can hold a family of twenty or thirty. Debby, a tree is big. We can vanish into cracks in the bark and never be seen. I . . . think we've got time. Help me take the rocket apart."

"Booce, it was tough enough putting it together!"

"You think I like this?" But Booce and Carlot were already tugging at pipe and nozzle, and Debby perforce joined them.

"The pipe is . . . priceless. We . . . can't let happyfeet . . . get it." Booce gasped in the thin air. The nozzle jerked loose and tumbled along the bark

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with Booce wrapped around it. His voice drifted back. "The rest they can have. We'll hide the pipe in some crack and guard it. Now we *really* won't have time to make cabins."

They pulled loose the pipe and water tank. The green puffball was closer yet, and a line of vapor trailed behind it. The vapor trail became a curve. . . .

Debby said, "It's dropped five men. Winged. Now it's going away."

Nozzle and tank floated, slowly rotating. Now Booce was free to look. "They're making for the Wart."

"We can't let them have it!" Debby cried.

"Well, the truth is, we can," Booce said. He was pushing the pipe ahead of him, kicking hard. Carlot and Debby flew to help. "Maybe the carm can take it back for us. If not . . . we don't need the Wart to reach the Clump. Those five that were dropped are after *us*."

The log was far east, drifting in the fringe of a storm complex. Rather found it before Jeffer did: shadow backlit by the sun.

Jeffer chased it down. The carm arced over the top of the out tuft, moved in along the east side of the trunk. The dock came into view: a rectangle of bare wood, ragged around the edges. Rather felt the pull of the forward jets and heard pondwater slosh toward him. Water had spread along the carm's walls and was creeping forward.

He wasn't actually getting used to this, was he?

"Where's the rocket?" Clave sounded merely puzzled.

Where they had built the rocket, there was nothing. Wait . . . there, drifting loose, a pale brown bell-shape: the nozzle. There, some distance away, a brown ellipsoid trailing lines. Where was Carlot? Where was anyone?

"What happened here?" Clave demanded. "An explosion?"

Had there been a fire? Rather found only the small black scar of the cookfire. The arrangements around it were undisturbed.

Jeffer said, "We can't search the whole tree. Where's the sun?" Straight east. "We won't get Kendy for another day."

"Take us in," Rather said.

Jeffer looked at him. "Why?"

"Just a guess." Carlot had gone in, last sleep.

Jeffer swung the carm toward Voy and fired the jets. They skimmed above the bark. The fog was around them now.

Jeffer played with the controls. "There," he said suddenly. "Five men." But what showed in the window was an abstraction, orange blobs on red-and-black.

"We're seeing by heat," Jeffer said. For an instant the normal view returned: fog sliding along black bark. Then the red-and-black was back. "Didn't Booce say something about Happyfeet?"

"Find our people," said Clave.

"Mmm . . . there." Three orange blobs in a line. By normal light they became three human shapes lined along a crack. "And the rocket pipe, I think. Rather?"

Rather quickly disengaged his seat belt and moved aft. He pulled the silver suit out of the water and slid his legs inside. Clave said, "Good. Get the rest of it on and go join the others. Take

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some harpoons. They won't have weapons. Jeffer, how did they get here?"

"Good question. I don't see anything that could have brought them. Something could be around the other side of the bark."

Rather waited while Clave bound six harpoons against the silver suit's chest. Air on; voice on. "Can you hear me?"

His voice blurted from the control panel, and Jeffer jumped. "I hear you fine."

"Let me out."

The bark was half a klomter distant. Rather used his jets. He thrilled to the pull of thrust along his body: blood leaving his head, abdomen settling toward his feet. Not quite a comfortable sensation, but one few others could share.

Behind him, the carm accelerated south around the curve of the trunk and was gone.

Carlot and the others had seen the carm; they waved.

Two klomters toward the blue blur of Voy, a hundred meters out from the tree, green-clad men emerged from the fog. They flew along the bark, peering into cracks as they passed. At this distance Rather could see only that they were five jungle giants, and armed.

They saw him. Their legs stopped moving, though their motion continued. Closer now. One was a woman. . . .

Then they were kicking again, turning back toward the storm that was reaching to engulf the tree.

He could catch them. They couldn't know about the silver suit. His tanks were full. Rather fired his boot jets; his course became an arc.

He could catch them. Then what? Kill them? Rather's parents had both killed. They didn't like talking about it. When they did, old anger distorted their faces. Yet this was the Silver Man's duty: from time to time, he killed.

One of the intruders looked back, and then all five were kicking madly, doubling their speed.

His arms were full of harpoons, hampered, while Debby and Carlot and Booce had no weapons at all. Rather swung back toward his crew.

He thumped into the bark not far from Booce. Carlot was looking at him oddly. He opened his helmet and said, "It's me. Five of them almost found you. What happened?"

"Happyfeet," Booce said. "A small jungle, steam-powered. Lupoff family, from the look of them. They want the Wart."

Rather thumbed his personal Voice on. "Silver Man calling the Scientist. Jeffer, they want the Wart. Go for that."

Nothing.

"They can't hear me. Booce, I'll guard you on the surface, but I don't think they'll be back. They looked like they were running."

Booce grinned. "They thought you were Navy."

"What?"

"Skip it."

Rather settled himself on the bark above their heads. Helmet closed. The invulnerable warrior (and Carlot had looked at him as at some alien bird). But the happyfeet warriors were gone from sight.

The storm enclosed the tree. The fringe of it was a fine mist, just beginning to obscure vision. *I wish I could*

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use those other kinds of light Kendy sees by. And the ventral camera's almost blind . . . hydrogen low, oxygen low, water volume low but increasing. We should have built a pump by now. Hey—

"What's that?"

Clave looked. "Jungle. Small. Just opposite the Wart."

Now Jeffer spotted green dots around the puckered bark. Men, and one was pointing toward the carm.

The voice of Kendy startled him. "I'm scanning in infrared. I can't see anything human outside of the Wart area. Take the carm closer. Give me a view."

Jeffer accelerated in. He asked, "Did you just come into range?"

"Yes. I'm running the record of your approach. You should have killed the invaders on the east side. They could attack your people."

As the carm approached, the jungle jetted away on a trail of steam: north into the storm, then around the trunk, steam spraying in a wide curve. It was hidden before the carm arrived.

Jeffer brought the carm to rest a quarter klomter from the wooden crater. The Happyfeet had been digging around one side of the Wart. Elongated men hovered around the block of black metal.

"Ten," said Kendy. Rings of red light blinked scientifically on the bark, haloing men Jeffer had already spotted, pointing out others. Three interlocked rings circled bare wood. "Four in the open, three between the bark and the Wart, three more in a crack outside the crater."

"We'd better follow the jungle," Clave said. "They could find the rest of us while we're busy here."

Jeffer turned in his seat, but Kendy spoke first. "There's time."

"They're too many to fight anyway," Clave said.

"Nonsense. Spray them with rocket exhaust. Jeffer, have you been shown the throttle for the main drive?"

"Yes." Jeffer didn't know the word *throttle*, but Lawri had shown him how to control the push of the rockets. His fingers danced.

The carm moved toward the Wart. The Happyfeet waited, blurred by fog, spears ready. "Brace yourself, Clave." The carm swung around, still approaching the puckered bark, but stern-foremost.

Men left the Wart, swimming hard. Others appeared from the bark beyond. Spears flew. The dorsal camera watched a bulbous-headed spear strike the hull, and explode in a puff of smoky flame. Authoritative thumps could be heard through the hull.

Jeffer tapped the main drive on.

It felt like suicide. He'd nearly died the last time he did that. The carm surged forward. Jeffer felt his chest sag, his cheeks pull backward in a dead man's grin. But his arm was rigid above his face, fingers almost touching the control panel.

It worked! Moving his fingertip down along the green bar reduced the main drive's thrust to something he could handle. *Throttle*.

A nearly invisible blue washed across ten happyfeet warriors. The invaders burst into vivid yellow flame. They were comets, the flame streaming back

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from them. Explosions sent bits of men flying—

Clave cried, "Treefodder, Jeffer! Stop!"

Jeffer tapped the drive off. (Hydrogen, oxygen: both quite low. The Wart receded.) "Clave, they attacked us. They've got exploding harpoons."

"They couldn't have *moved* the Wart with us on their tails! We only had to take it away from them!"

"All right, Chairman." Jeffer turned to look at Clave. "Now tell me what they're doing to Booce and Debby and Carlot."

"It's time to learn that," Kendy said. "Time to move, Jeffer. I've lost sight of the jungle from *Discipline*'s position. It circled half around the trunk and was approaching the point where you dropped Rather. We'll have to get there fast, before I'm out of range. The invaders here are harmless enough now."

They were. Some were still writhing, some were motionless, but all were burned black. Jeffer set the carm moving. It was too early to feel guilt.

They were in the cloud now: a thick, swirling fog, growing thicker. Jeffer could see the tree only as a wall of shadow. Kendy said, "Turn starboard. You need not steer so wide of the trunk, Jeffer. I have infrared."

Around the trunk in a great curve. Lightning flared suddenly aft.

"I have the jungle in view, straight out by five point six kilometers. Straight out, Jeffer."

"I can't see."

"Ventral. Two degrees more. Good. Accelerate. Cut! Rather has the jungle in view. Silver Man, come in."

Rather's tinny voice spoke from the control board. "I see a big shadow, but no detail. They can't see us either."

"They've found you somehow," Jeffer said.

"You're near," said Kendy. "Swing one-eighty degrees."

"I won't—"

"Citizen, I don't know where the men are! What else can we do but attack the jungle itself? Swing around." Something strange in Kendy's voice.

Jeffer turned the carm. He half-hoped Clave would countermand the order, but Clave said nothing.

"Main drive." Kendy should have sounded excited. He only sounded *loud*.

Jeffer tapped the button. The carm surged. His face tried to crawl around to the back of his head. A yellow light bloomed in the mist behind him, and he heard Rather's gasp. He killed the drive, but the yellow light remained.

The harsh bass said, "Done. I'm losing range—"

Clave said, "You kill too easily, Kendy."

Kendy's voice was becoming blurry. "Citizens, you're missing the point. This was a mobile jungle. These Happyfeet may have contacts in the Admiralty. They've seen the carm and the silver suit."

"Men aren't honey hornets, Kendy!"

There was no answer.

Rain drifted across the carm's main window in drops the size of fists, carried by eddies in the wind. The wood outside was black with water. Inside the cabin it was soggy enough. Jeffer's segment of pond had spread a film of water across all the walls and the cradles.

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Warm, dry air blew from vents fore and aft, thrusting the water away from it. The citizens clustered around the aft jet.

Next time I'll pump the water, Jeffer thought. *Got to build a pump.*

Carlot said, "We saw that huge shadow come out of the fog. It was scary enough. Then five . . . well, they could have been birds for all I could *see*, except that they were flying toward the jungle and thrashing at both ends. Waving their arms, I guess. It was the bandits who ran away from Rather. The jungle stopped to pick them up."

"They were Lupoffs," Booce said. "I know their clothing. I've met them in the Market. A big family, three jungles, and they'd colonize if they could buy another firepipe. They're crowded."

Clave said, "So?"

"If the Lupoffs find out what happened here, you'll have two jungles hunting you."

"They won't find out." There was no triumph in Clave's voice. Jeffer shuddered.

They were warm enough, dry enough, if they stayed in the air jet. But the storm splashed rain across the bow window, and through the rain came the yellow glow of the burning jungle.

"I wouldn't mind killing a bandit or two," Booce said. "I've been robbed once or twice. It's the scale of the thing that bothers me. There must have been forty citizens in that jungle, not counting children."

Clave jumped toward the fore end of the cabin. After a moment, Jeffer followed. The fore air jet was as dry as the aft.

Clave said, "I'd had enough of that."

"Forty people," Jeffer said. "There just isn't any way to make them stop talking about it."

Clave's voice was a hoarse whisper. "Persuasive, is he? Nobody but you can be trusted to talk to Kendy, right? You burned them while they were trying to rescue their citizens!"

"They attacked us."

"With spears. So?"

"What was I supposed to do? They were threatening *our* citizens!"

Clave sighed. "I'm not blaming you. And if I am, I shouldn't be. But Kendy —" By the flick of his eyes, Clave had remembered that Kendy would hear this. He began pronouncing his words with more care. "Treefeeding Kendy killed them like a hive of honey hornets, because they were in his way. Because they might talk to the wrong people!"

Silence and discomfort. Debby came to join them. "Wet," she said. "What did you do to get it so wet?"

Jeffer didn't answer. To Clave he said, "I felt much worse when I killed Klance the Scientist to steal the carm. He wasn't expecting it. These citizens were. They were making war."

"Right!" Debby said enthusiastically. "When London Tree raided us, I used to wish we could capture this thing and set their whole tree burning. The bandits aren't the same, but by the State, we finally did it!"

"Don't do it again," Clave said. Jeffer nodded. ■

CONTINUED IN NEXT ISSUE

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the reference library

By Tom Easton

The Cunningham Equations, G. C. Edmondson and C. M. Kotlan, Ballantine/Del Rey, $2.95, 295 pp.

The Kundalini Equation, Steven Barnes, TOR, $3.50, 348 pp.

A Baroque Fable, Chelsea Quinn Yarbro, Berkley, $3.50, 243 pp.

Firechild, Jack Williamson, Bluejay, $17.95, 384 pp.

Twisting the Rope, R. A. MacAvoy, Bantam, $3.50, 256 pp.

Deathhunter, Ian Watson, St. Martin's, $12.95, 176 pp.

New York by Knight, Esther Friesner, Signet, $2.95, 256 pp.

Halo, Paul Cook, Bantam, $3.50, 304 pp.

Devine War, Dennis R. Caro, Arbor House, $14.95, ? pp.

Howard Who? Twelve Outstanding Stories of Speculative Fiction, Howard Waldrop, Doubleday, $12.95, 181 pp.

Since a pair beats one of a kind, finding two "equation" books in this month's stack gives me a natural lead. The first is G. C. Edmondson's and C. M. Kotlan's **The Cunningham Equations**. Blaise Cunningham is the 29-year-old Nobel Prize winner responsible for a tremendous advance in artificial intelligence. He is also an alcoholic consumed by guilt because his parents died in a highway crash; they were on their way to meet a lecture obligation he could not make because he was too drunk. He works for a genetic engineering company controlled by unsavory interests. His job is to develop an interface for a biological computer derived from insect nervous tissue, but he is not succeeding.

His buddy, Gordon Hill, seems to be having more luck with work on the biological end of things. Just before he disappears on some mysterious task, he gives Blaise a remarkably intelligent dog for safekeeping. The dog proves his intelligence when, on a visit to Gordon's

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two-week-deserted house, he shows Blaise where the key is hidden.

Unfortunately, that wasn't really Gordon's home. Within pages, the authors tell us that Gordon really lives somewhere else, with a wife and kids who have been missing him for two weeks. Blaise even goes there, with the dog, to meet the wife and promise to track Gordon down and tell him to call home. I may be dense, but I find the inconsistency confusing and wish the authors or their editors had noticed and fixed it.

Anyway, the plot soon thickens. . . . Stimulated by a red-headed femme fatale and the more ordinary Helen, he learns that Gordon is transplanting biocomputers into people, at sixty grand a pop, as intelligence boosters. He is working for those unsavory interests, his excuse money, and he seems not too upset about ducking the federal regulators. His bosses have destroyed all his experimental animals, so he has no idea of long-term side-effects, but what the heck, there's still the dog, as well as all those human subjects.

You know what's going to happen, don't you? The book's cover even gives you a clue in its painting of an insect leg emerging from a computer screen to grab a pretty blonde by the throat. Nothing like that happens in the story, but yes, those bug brains do take their masters over in a remarkably gruesome way. And Blaise, Helen, the dog, and the defecting Mafioso must do their best to stymie the grandest criminal plot since Batman last fought the Penguin.

That's right. I didn't like it much. It's derivative and sloppy. In addition, one of its best points is also one of its worst: Blaise stops his drinking as the story develops, but at the beginning he is a full-blown drunk, and the authors have captured what must be the characteristic feature of a drunk's reality—disconnectedness, due to inattention and forgetfulness—with remarkable success. Unfortunately, their success makes the story very hard to follow at first.

A far more successful "equation" is Steven Barnes's **The Kundalini Equation**, a nice *reductio ad absurdum* for the martial arts and human potential movements. Barnes supposes that the expansion of strength, focus, and power that come with training in karate, taekwon-do, and the like is but a fragment of the potential which could be grasped if one could only find the whole truth behind all of today's fragmentary mysticisms. And then he gives us Adam Ludlum, a quintessential nerd, an obese schmuck who can never stick with a diet or an exercise plan long enough to get anywhere, who embraces fads hoping for miracles, who feeds his self-pity with beer, junk food, and tobacco.

Circumstances finally drive Adam to determination. He decides to *do something*, and do something he does. High on the pamphlets of the disciples of Savagi, a strongman guru, he starts working to master the beast within. He fasts, meditates, breathes, jogs. And he makes it. He becomes such a superman that when he comes the mattress bursts into flames (which is what "kundalini" means—sexual power).

But he awakens something awful. Deep within him is a reptilian *presence* that craves blood. It takes over, Los Angeles shudders in the night, and the bloody-minded Savagists begin to drool. Here is their master! All they need to do is kidnap Adam and control his mind with mystic chants, and the world is theirs!

Happily, Adam's friends have other ideas. His girlfriend Micki, his buddy Algy, and his old sensei pursue. There

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is also Gates, the LA cop who wants the Neon Killer's ass. Together—of course!—they save the world, and we learn that there is a right turning as well as a wrong one on the path to apotheosis.

I think Barnes had a lot of fun when he was writing this one, but that did not stop him from savaging the cults that pursue physical and temporal power. He favors the pursuit of mastery over the self alone, the combination of physical development with spiritual discipline, and he espouses the value of this pursuit very well.

Chelsea Quinn Yarbro's **A Baroque Fable** has its moments. Studded with frothy lyrics *á là* Gilbert and Sullivan, complete with scores, it is the tale of an evil sorcerer, a wicked witch, a fair maiden, a princely chump, an oh-so-bored princess, a hysterical queen, and a king who tends to his knitting. There are also musical trolls, an ogre, a handsome crumpet-baker, an astrologer, an absent-minded wizard, and a spy.

In a hovel in the Woebegone Woods, the witch turns the maiden into a diminutive dragon. When word reaches the happy kingdom of Alabaster-on-Gelasta, Prince Andre decides he must a-huntin' go, accompanied by his sister, who craves excitement, or at least *variety*, and the princess-besmitten baker. The Royal Papa gives permission, the Royal Mama has conniption fits, and they are off, even as the sorcerer dreams of new evils and his spy seeks to sow chaos in Alabaster-on-Gelasta.

Yarbro plays it for laughs, and on the way to her musical-comedy happy ending she does manage to evoke a chuckle or two. But on the trip she also beats Gilbert and Sullivan thoroughly to death. The grand excesses of sentimentality, bathos, and melodrama very quickly grow tiresome, and the character with whom the reader feels the most sympathy is the oh-so-bored Princess Felicia.

Jack Williamson produces a masterly mix of gobbledygook and science to justify his latest, **Firechild**. Engene is a research outfit devoted to genetics. Its people have plenty of money, and their mysterious backers have given them their heads. And they have made such tremendous progress in genetic engineering, the latest technology to infatuate SF writers and the public (with reason), that the Defense Department has taken them over. Guess why.

As the story opens, Saxon Belcraft has received a phone call from his brother Vic, an Engene researcher. Sax picks up some ominous vibes and refuses to wait for the letter Vic says is on the way. He hits the long road to Enfield, Engene's town. Unfortunately, he arrives to find the road blocked by troops. The town is dead, apparently the victim of the accidental release of a horrible plague that consumes everything organic.

But the plague itself dies, leaving only ashes. Sax enters the ruins, searching for some trace of his brother, and finds a single living being: a tiny, pink, wormlike thing that evokes instant sympathy and love. He takes it back to his motel room, feeds it and, when it crawls to the door, lets it go, just as the military arrives, lead by a religious fanatic and would-be U.S. dictator. He blames the worm, whatever it is, for Enfield's destruction and he wants it, first to wring from it the superweapon it used and then to destroy it as the spawn of Satan. Eventually, Sax is allowed to return to his medical practice.

Meanwhile the worm finds an escaped convict to feed it, and we learn

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its name, Alphamega: Meg. She grows, coming quickly to resemble a big-headed human child, and when the troops find the felon, she escapes and falls down a well. Through a dream, she summons Sax back to Enfield to rescue her. Unfortunately, both are then caught and imprisoned. Fortunately, Meg proves able to heal Sax's and the felon's injuries, giving their captors a hint of her vast powers and electrifying both their greed and their fear. She has the same effect on the Soviets, whose agents are also seeking the secret of Enfield, and these agents are the key to her escape.

In due time, we learn that Meg is Vic's creation, his effort to counteract the ultimate disaster brewing in Engene's other laboratories. She has some of his own genes, those of other humans, and those of assorted animals, but her chemistry—even that of her genes—is not that of Earthly life (and here we have some of that gobbledygook I mentioned). Her development needs no womb, for she begins in a Petri dish. Thereafter, at all her "embryonic" stages, she is more or less independent, needing only love and food. And she grows quickly toward the mission Vic envisioned for her.

Is she successful? I won't say, for that would spoil the tale, and it is not really Williamson's point. He is discussing the potential of genetic engineering, the fears many people hold of such drastic changes in the very substance of life, the religious antipathy to "artificial creation," the greed and eagerness for death in the military mind. His conclusion seems to be that the potential renders the fears and greeds irrelevant.

And he is worth attending. The tale is effective and moving, and it may well cop its author another Hugo or Nebula.

Roberta MacAvoy returns us to the world of *Tea with the Black Dragon* with **Twisting the Rope**. As before, the stars are Martha Macnamara, fiftyish and sensible musician, and Mayland Long, the Chinese dragon who turned himself into a man. They are lovers, partners, so thoroughly fixated on each other that wealthy Long assigns himself the role of road manager when Martha assembles a group of musicians to tour the country with Celtic tunes. There is the Irish youth, Patrick O'Sullivan, who plays accordion and flute and can at need imitate his sister's singing quite effectively, and the young woman who might become his sweetheart, harpist Elen Evans. There is the New Age guitarist, Teddy Poznan, and the obnoxious piper, George St. Ives. And, in the final week of the tour, there is Marty Frisch-Macnamara, three years old, foisted on Martha by a busy daughter.

Conflicts are obvious from the start—George rags everyone in sight, but especially Pat; money is missing; a practical joker nearly maims Long; the theater manager refuses to pay the fee he owes until Long roughs him up; and Marty suddenly goes all weird, searching for a mysterious "Judy" and taking on the physical appearance of a retarded goblin. And then George shows up dead and Marty disappears.

The book's title refers to an Irish courting ritual, and there is indeed some courting in the tale. Unfortunately, it isn't directed at the reader. MacAvoy may, after her past considerable successes, be beginning to take her audience for granted. *Twisting* is slow to develop and move; the plot is thin, owing perhaps too much to the characters' unfathomable impulses and the author's whim; and Martha and Long lack the enchantment that made *Tea* so pleasing. You will enjoy reading the book, but you will not be satisfied. I hope MacAvoy

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can do better next time.

Ian Watson's **Deathhunter** is more satisfying. He posits a future in which the shock of nuclear war has driven the Western world to embrace death. Thanks in large part to the efforts of a mediocre poet, society has rejected the idea of Death as the Great Enemy, recognized it as a natural part of the life cycle, and established Houses of Death in which one can come to terms with the end of one's useful life, with the aid of trained guides such as Jim Todhunter. When people are ready, they check out.

Todhunter has been researching the ideologically suspect topic of life after death. To discourage him, he has been reassigned to Egremont, but as he arrives that mediocre poet is assassinated by a man whose aim, paradoxically, is to save him from Death. As the assassin's guide, Todhunter learns that this man too is a researcher, and he thinks he has identified Death as an actual entity that might be trapped and destroyed.

Of course, the assassin is deluded. But Todhunter wonders. He is convincing. He meshes with Todhunter's own obsessions. And Todhunter resolves to let the assassin test his ideas—the result will either confirm a remarkable idea or blow a delusion out of the water and prepare the assassin for his own death.

This being an SF novel, you can guess what happens next—the assassin proves right, though there remains the full truth for him and Todhunter to learn. And then there's the whipsaw ending—Watson hands us the old "It was all a dream" chestnut, but then he cracks the chestnut to show us something else. His final successful note is the chill that runs down the reader's spine. The book is done, but the story, as good stories should, continues to resonate.

I recommend it.

Once upon a time, a dragon came to love the boy who served it. But the boy fled, learned the magic that had some hope of destroying the dragon, and became a knight. The dragon, bitterly enraged, returned to its lifestyle of flagrant despoliation and rampaged through the planes of the multiverse, leaving a trail of barren, lifeless worlds. The knight pursued. Now both have come to Earth, the dragon as a fancy lizard on a pet shop shelf, powerless but ready to gorge, enslave, and destroy; the knight, in his armor, on a white horse, in the middle of a storm of brickbats in Spanish Harlem. Stripped of his armor, his horse fled, he is rescued by a local who cannot resist stray cats and taken home to meet the waif who will become his sidekick: Sanchi (who is no Panzi).

So begins Esther Friesner's best work to date, **New York by Knight**. It starts off in a jolly, slapstick mode, but before long we are immersed in serious business indeed. The dragon moves out of the pet shop and establishes a clawhold on the minds of a pair of typically shallow, petty Manhattanites. The knight moves into his own quarters with Sanchi, searches out and regains most of his armor, all but the mystic dragon-killing sword, and acquires a history-student maiden. They visit a world of the dead, where the maiden loves an elf and learns of the past, and the dragon goes public, taking over St. Patrick's Cathedral for his throne-den. And the final battle approaches.

Friesner knits many strands drawn from the variety of love—unrequited and eternal, physical and platonic, man-woman, man-man, and beast-man, maternal and filial; and even the love of the living for the dead (and vice versa)—into a vigorous and charming tale. Some of the charm arises from her gift for hyperbolic characterization, as

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with the Jewish mother whose hysterics "deserved either an Oscar or Thorazine." Some comes from her combination of satire, Manhattan, and medieval fantasy, which I found delightful.

Her light touch and her avoidance of psychological and philosophical depths make *New York by Knight* a light tale, doomed to the short life of "pure entertainment." But it is something more, for the psychology and philosophy are there, befitting Friesner's background. And you'll enjoy the book. Buy it.

In Paul Cook's **Halo,** Earth has been paralyzed by basketball-sized Seeds dropped from a passing Halo, an alien-built structure that came zooming through the solar system at a fifth the speed of light. The Seeds softlanded in cities, where they began emitting powerful alpha waves that turned the populace into mystic zombies and brought civilization to a standstill. Only the Moon Men remain, safe in their lunar bastions, to find a way to save humanity.

As the story opens, the Moon Men, lead by Ross Trenton, a psychiatrist who uses his patients' past lives to illuminate their present problems, have come to Lake Tahoe, where a single seed has missed its urban target. It alone is not surrounded by hordes of fanatics willing to die to prevent any interference with their alpha-wave fix. Furthermore, its emanations are muffled by 600 feet of water; it can be approached fairly safely. The Moon Men intend to salvage the Seed and find out what makes it tick. But first they must fight off the local secessionists.

Meanwhile, back on the Moon, Trenton's nine-year-old twins, vowing to help their Daddy find their missing mother, take a crawler and find a cache of dead and broken Seeds. In them they find mysterious objects, including small spheres that awaken their past lives and exponentiate their intelligence. Suddenly, they are able to solve the problem of the Longjump, the instantaneous leap across the light years their mother had been seeking before she had been trapped by a California Seed. They modify a ship, leave stones for their playmates, and take off to find the source world of the Halo and Seeds and, perhaps, their mother.

Back on Earth, Ross's Moon Men learn how to kill Seeds. They learn of the twins' departure, and with the aid of the other kids, who have duplicated the twins' technological genius, they are off in hot pursuit. And we learn the why of it all, including a fascinating linkage between biology and physical technology. *Halo* is as much worth reading as Cook's last novel, *Duende Meadow*. It is a fascinating yarn, fast-moving, exciting, and even moving. Cook even makes us swallow the gobbledygook of brain waves, karma, and past lives without gagging.

Dennis R. Caro successfully confuses the reader with **Devine War**. It takes half the book before the reader has even a foggy idea of what is going on, though Caro does tell us that the galaxy was settled only when people realized that it was simpler to build worlds than to find them. And then there was war, West against East, ending only when one side ran out of money and quit. Now, on Freehold, Ambassador and ex-intelligence agent JoAnne Devine reports a rebellion and calls for troops. Meanwhile, back at headquarters, intelligence has its problems, as an evil-minded bureaucrat resists retirement by moving into a clandestine computer and out-of-practice spy-masters struggle to decide how to respond to Devine's report.

There is some entertainment in the resulting symphony of screw-ups, and

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in the odd characters—including Martha the lioness and Heathcliff the berserk desk—whom Caro has invented. But that is not enough to counter Caro's inability to make his world clear to the reader.

Avoid this one.

In **Howard Who?** Howard Waldrop, introduced with hosannahs by George R. R. Martin, gives us a wealth of marvelous short stories. There are "The Ugly Chickens," "God's Hooks," "Ike at the Mike," "Mary Margaret Road-Grader," "Man-Mountain Gentian," and more. There is no "Flying Saucer Rock and Roll," alas, but you still won't be disappointed with Waldrop's unique blending of unlikely components—Izaak Walton and John Bunyan, Ike and Elvis, Detroit and rodeos, sumo and telekinesis, vampires and cowboys, robots and Disney. Waldrop is a zanily creative writer who can be both hilarious and moving on the same page. He invites us to see the world anew as do few other writers in any genre. ■

ON GAMING

(continued from page 121)

touch the key to access the communications terminal.

If you identify yourself as the "Infiltrator," the plane may respond by saying jauntily, "Good luck, Jimbo-Baby."

On the other hand, it may be one of the Mad Leader's planes which responds with a "Die Capitalist Dog," and sends a heat-seeking missile at your snazzy ultra-sleek copter.

The Gizmo comes with an assortment of armaments courtesy of Wizbang Enterprises. ("Like a child's affection for a pet—love, care, and a sense of responsibility go into every Wizbang Antipersonnel Mine".) There are cannons (Wizbang Whizzers), missiles (the Wizbang Waster), flares, and chaff to misguide an enemy's heat-seeking missile.

Assuming you get through this net of friends and foes alike, Johnny gets to land. Each mission carries a definite objective, and you can exit your copter and infiltrate the Mad Leader's base. An inventory screen displays the status of the items you carry, such as secret papers, explosives, cameras, as well as any items you find.

The action can get quite tense and sometimes I found myself hitting the pause button just to get a breather. Slow moving it's not.

But the real prize is the rule book. There's a lot of information in this game, and it's all presented in a highly readable fashion. A quick reference card is supplied that contains all the crucial procedures for taking off, landing, and carrying out a ground mission. I do wish, though, that Mindscape had allowed players to select a level of difficulty. I spent a good part of an evening being accosted by the Mad Leader's planes (which had me quickly flipping to page 27, "Ways to Crash").

But then you wouldn't be Johnny "Jimbo-Baby" McGibbits, who says: "I never go anywhere without my McGibbits Trim-Fit bullet proof designer jeans. Timeless style, seamless fit, and safety from close range machine gun fire—all at a sensible price." ■

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brass tacks

Dear Dr. Schmidt:

You mention a story in your August 1986 editorial, and say you cannot identify it. I believe the novelette you cite is "What Dead Men Tell," by Theodore Sturgeon. It ran in the November 1949 issue of *ASF*, commencing on p. 122.

The story may have been reprinted in one or more anthologies; I don't know its printing history. But this was its original appearance (assuming it is the one you remember).

ROBERT T. NOBLE
Silver Spring, MD

Dear Dr. Schmidt:

The August issue just arrived, and of course I read your editorial first. Aside from the topic itself—Sweet Misremembered Youth—the story you refer to near the end may be as follows. I also do not recall the title or author. Protagonist discovers a man who has invented a device for viewing the past, as if on a holographic set. They use it to film a series of historical films, showing the truth about various important events, like the crucifixion. Result is overwhelming riots, all around the world, and breakdown of society. If the author said something like "security is in the past" in that story, it would have been sardonic; that uncovering what the past really was, would be extremely upsetting to one's personal sense of security. Security is in the past only as long as no one disturbs your recollection. Well, the story would be quite relevant to your discussion. Compare Martin Rymes's letter to the editor in that issue—I, too, much prefer the positive viewpoint that while there are, and will be, great problems; still, based on our history the human race will cope with them (notice I didn't say "solve them") and go on. Those whose neuroses demand that we give up should go sob to themselves in

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some corner. And the Robert Engs letter! What bilge!

RINEHART S. POTTS

Glassboro, NJ

I don't think either of these stories is the one I remember, which I think made the theme quite explicit—but my thanks to everybody who suggested a possibility. Incidentally, Mr. Potts's nominee is "E for Effort," by T.L. Sherred, and well worth rereading.

Dear Stan,

I really enjoyed the August edition mainly because of the conclusion of Vernor Vinge's *Marooned in Real Time* and J. Brian Clarke's "Intent of Mercy." I think I like the serials in the mag best . . . both the formal ones and the informal ones that might stretch over years. Often when I'm reading a story that is a sequel to a previous one it takes me a few paragraphs to put it into the right context.

Now I am one who likes to reread good material. I've lost count of how many times I've read Tolkien's *TLOTR* and Asimov's Foundation Trilogy. What I'm saying is that I like to dip into my *Analog* collection quite often and reread stories. I especially feel this way when I'm reading a story for the first time and realize I've met these people or this alternative reality somewhere before!

Now when that happens it's time for me to head over to my shelves to start pulling old January issues and looking up the author's name in the index for the previous year. I'm sure there are others who feel the same way who haven't yet figured out they can use the index this way. It really would be nice just to have the information at the beginning of the story in a footnote.

Talking about continuing stories, I want to put in my two bits about Harry Turtledove's sim stories. Robert Engs's complaints in Brass Tacks about Turtledove's being a racist are really off the mark. He needs to read the first installment, where the question is whether the sims are really human or not. The Europeans seem to have concluded they aren't. (In our timeline a similar conclusion was made about Amerindians, which of course was wrong.) Engs is concluding that in Turtledove's timeline the Europeans are right in making such a conclusion. But the first story made me wonder if *Homo erectus* really is less human than *Homo sapiens*.

Of course you are so right in saying that one must never conclude that a character's views are necessarily those of the author. It is also important to realize that the narrator, even a supposedly omniscient third person narrator, can not be automatically identified with the author. The views of the narrator are not necessarily those of the author . . . even what seems to be a straightforward statement by the author like Vinge's afterword to *Marooned in Real Time* is really only the narrator speaking. Just because the afterword seems to place humanity's hope solely in human advancement and discounts any religious transcendent event does not mean that Vinge actually thinks this way. He might, he might not.

But what if he does? Should I blast him and you because the story reflects a view of reality I disagree with? Should I write a letter strongly protesting the anti-religious bias of Vinge and *Analog*, threatening to cancel my subscription if you don't shape up and not print any more material that offends me? Of course not! Even if Vinge is anti-religious (I'm not saying he is), he has the right to present such a view. If it offends me, (and I would be offended if someone falsely concluded that all who believe in Christ's Second Coming are like

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Jason Mudge), maybe it is good to be offended once in awhile.

If I disagree with some view of things, the right course to take is not to attack the person who holds such a view and attempt to muzzle them. The right thing to do is to attempt to convince them to my position using evidence and reason. This can be frightening for many people, I think, because such a tactic always leaves open the possibility that instead of my convincing my opponent, my opponent might convince me. It is always easier just to scream, "You are a (choice of derogatory term) for thinking such a way!" than to say "You are wrong. Here are the reasons why. What is your response?"

PASTOR RANDY KEEFE

Naches, WA

Dear Dr. Schmidt:

Several months ago my children rented a movie tape about an Irish tippler who searched diligently for the "little people." He found them, and often saw them where others did not.

I am writing this as I have just read Mr. Engs's letter in the August 1986 issue of *Analog*. In my lifetime I have met several people who look for bigots everywhere. Like the man in the Disney movie, they see what they are looking for where no one else does. I hope Mr. Engs is not one of those unhappy people.

TOM MEYEN

Dixon, IL

Dear Dr. Schmidt:

I enjoy alternate timeline stories, and I have especially enjoyed Harry Turtledove's "sim" series. I found Robert Engs's criticism (Aug. '86) almost incredible. He flutters off in pursuit of a very strained interpretation of Mr. Turtledove's stories as somehow "racist." I doubt if Mr. Engs's knee would have jerked quite so hard if the sims had been described as having originated on another planet.

I pity those whose inner turmoil causes them to see everything in terms of their present political fancy. It results in a certain blindness. As a political scientist, I see far too much of this in the academic world around me. I can't tell if Mr. Engs even realizes these stories are set in an alternate timeline similar to ours. He shrieks about ". . . a *real* world—ours, and in *real* time . . ." Then—a teacher of *history*—he misidentifies the "Wilberforce" character with William Wilberforce, the great anti-slavery crusader who lived about a century later.

But the thing that most makes me pity Engs is his utter failure to appreciate the framework of "And So To Bed," even though the author hits us over the head with it (". . . see how Samuel peeps.") In that timeline, Samuel Pepys writes an even more interesting diary; and his May, 1661 is not a blank. Unfortunately, in our timeline, all Pepys recorded doing in that month was to get a haircut. In the alternate May, 1661, Pepys comes up with the theory of evolution two centuries before Darwin. Doubtless he became President of the Royal Society even sooner than in our timeline.

Thanks to Mr. Turtledove for a fine series of stories, which I hope will be continued.

J.E. WILLIAMS

Carrboro, NC

Dear Stan,

I have just completed reading "ABCs In Zero-G" (August, 1986) and feel compelled to write and congratulate you and Elizabeth Moon for giving us this story.

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I have been a quadriplegic for 16 years, and I can tell you that Pat's reaction to the news of Dave's injury, and his prospects for a future career and life, are all too typical of those found among nondisabled persons. Too many times the main handicap faced by disabled persons is the attitude that nondisabled people have about our abilities. They insist on looking only at what we cannot do, and never consider the possibility that with creativity and flexibility in adapting to our environment we can use our abilities to live full and productive lives. Ms. Moon correctly shows us that the most difficult aspect of being a disabled person is breaking through the barriers nondisabled people create through a lack of knowledge about the real abilities of disabled people. Stories such as this help us in educating nondisabled people to our potential.

One additional point. Moving disabled people into the microgravity of space, where not being able to walk or perform other gravity related tasks is negated, will not solve the problem of equal opportunity for disabled people unless we all change our restrictive attitudes and look at abilities, not disabilities.

Thank you, Ms. Moon and Mr. Schmidt. Keep up the good work.

TONY YOUNG

8403 Thames Street
Springfield, VA 22151–1518

Gentlemen:

In "The Reference Library," August '86 *Analog*, Tom Easton gives a sampling of his "New Kind of Fiction." (Written by a computerized random story generator.)

"New?" Hell, man, I read stuff like that every day in court decisions and lawbooks! To say nothing of what I get in junk mail, from editors and writers and IRS publications.

"Hooked on Clips": Shouldn't that have been an article, not fiction?

I've had a gregarious, friendly, high-IQ Blorch under my bed for years. I feed it paper clips. In return, it helps me while away many hours of writer's block with philosophical discussions about the Meaning of Life, the taste of the glue used on stamps, how editors select stories, and other cosmic matters. (My Blorch, one of your Blorch's offsprings, says you nail title pages on the wall, turn around, throw handfuls of darts backwards at them; the one that survives the longest without getting stuck is published. Is this true?)

The enclosed rejection slips are seeds from my Blorch. It just finished its 60 year puberty and feels "the urge." It will make an excellent companion for Stanley Schmidt's friend, the one that resides under your desk at the office and sometimes rides home with you to vacation under the bed at home.

BLORCH POWER!

EUGENE AUSTIN

Orange, CA

To the Editor:

I am planning to catalogue my science fiction/fantasy library in a database on my personal computer. I want to include a list of concepts contained in each book that are significant factors in the story, i.e. genetic engineering, telepathy, Norse gods, L5 stations, etc. If any of your readers have already completed such a project, I am interested in hearing from them. If anyone has created the equivalent of a taxonomical hierarchy, I am especially interested.

NEIL RATZLAFF

140 Locksley Ave
San Francisco, CA 94122 ■

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continued from page 10

panies that make traps and insecticides can make a lot of money selling them in peak years, without having to spend any on promotion the rest of the time. Maybe they've thought about the alternatives and prefer it that way. A massive public education campaign in the off years, urging people to trap moths *before* there are many to be trapped, might be more effective in controlling the moths. But the year-in, year-out publicity would cost, and in the long run it might well be less effective in producing profits. And that just may be far more important in determining what gets done.

I'm not saying that *is* why the problem is handled in the present rather bizarre fashion. I don't know what goes on in the boardrooms of companies in the anti-moth business, and I'm perfectly willing to concede that I'm not an entomologist and there may be sound biological reasons why my proposed alternative is not as good as it sounds. But I do find it a mite disturbing that we just keep doing it this way, and seldom hear any discussion of basically different approaches. Does it *really* make more sense to go after a problem with bludgeons, when it's out of control and about to collapse anyway, than to use safe, routine preventive measures to keep it from getting that bad in the first place? I'd like to hear some open discussion about that.

Meanwhile, it is left as an exercise for the reader to consider how many other problems we treat the same way. ■

IN TIMES TO COME

● David Hardy is probably best known for his spectacular astronomical paintings and planetscapes, so at first thought it might seem a little surprising to be featuring his work on a cover story set entirely on Earth. But Earth is a planet, too, and a pretty exotic one at that—especially in the future of Charles Sheffield's "Trader" series. This one, "Trader's Cross," takes Mike Asparian to one end of the Earth on a decidedly peculiar quest—with an unexpected and disconcerting side effect.

Eric Vinicoff will also be back with perhaps the most unusual story yet in his "High Lord" series—wherein the High Lord discovers that there's nothing like an identity crisis of the most literal sort for learning what a problem looks like from another perspective. And, of course, we'll have Part III of Larry Niven's *The Smoke Ring.*

● The golden rule is that there are no golden rules.

George Bernard Shaw

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a calendar of analog upcoming events

31 January-1 February
CHIMERACON IV (North Carolina SF conference) at U.N.C. Student Union, Chapel Hill, N.C. Guest of Honor—Alan Wold. Registration—$8 in advance, $10 at the door. Tournament gaming, variety show, workshops. Info: ChimeraCon 4, Estes Park, Apt. 2-K, Carrboro NC 27510.

13-15 February
BOSKONE XXIV (New England area SF conference) at Sheraton Boston Hotel, Boston, Mass. Guest of Honor—C.J. Cherryh, Official Artist—Barclay Shaw, Special Guest—Tom Clareson. Registration—$17 until 16 January 1987, $27 at the door. Info: NESFA, Box G, MIT Branch PO, Cambridge MA 02139-0910

13-15 February
CONCEPTION (50th anniversary of 1st UK SF convention) at Queens Hotel, Leeds, U.K. Registration—L6 in advance. Info: Conception, 12 Fearnville Terrace, Oakwood, Leeds LS8 3DU, U.K.

13-15 February
ECLECTICON (Sacramento area SF conference) at Sacramento Inn, Sacramento, Calif. Guest of Honor—Stephen Goldin, Fan Guest of Honor—Annette Laing, TM—Gordon Garb. Registration—$15 until 1 December 1986. Info: Eclecticon 1, 4440 Arden Way, Sacramento CA 95864.

14-16 February
CLIPPERCON 4 (Baltimore area Star Trek conference) at Baltimore, Md. Guests—George Takei, William Campbell. Registration—$30, banquet $30. Info: Marion McChesney, 3429 Chestnut Avenue, Baltimore MD 21211. (301) 235-0915.

20-22 February
CORFLU 4 (Fanzine fan convention) at Cincinnati, Ohio. Info: Bill Bowers, 2468 Harrison Avenue, Cincinnati OH 45211.

20-22 February
WISCON 11 (Wisconsin SF conference) at Madison, Wisc. Guest of Honor—Connie Willis, Fan Guest of Honor—Avedon Carol. Registration—$14 until 15 January 1987, $20 at the door. Info: SF3, Box 1624, Madison WI 53701.

27 August-2 September 1987
CONSPIRACY '87 (45th World Science Fiction Convention) at Metrople Hotel & Conference Centre, Brighton, U.K. Guests of Honor—Alfred Bester, Doris Lessing, Arkady and Boris Strugatsky; Fan Guests of Honour—Joyce and Ken Slater; Artist Guest of Honour—Jim Burn; Special Fan Guest—David Langford, TM—Brian Aldiss. Registration—Attending (until 30 September 1986) L25, $40, $A50; Supporting L10, $15, $A20; This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: ConSpiracy '87, Box 43, Cambridge CB1 3JJ, England, U.K. OR Bill & Mary Burns, 23 Kensington Court, Hempstead NY 11550 OR Justin Ackroyd, GPO Box 2708X, Melbourne, Vic. 3001 Australia.

3-6 September 1987
CACTUSCON (North American SF Conference) at Hilton, Hyatt Regency, Convention Center, Phoenix, Ariz. Guest of Honor—Hal Clement, Fan Guest of Honor—Marjii Ellers. Registration—$15 supporting; $30 attending until 15 September 1986. Info: CactusCon, Box 27201, Tempe AZ 85282. (602) 968-5673.

—Anthony Lewis

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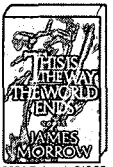

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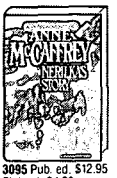

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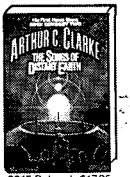

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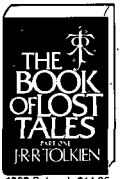

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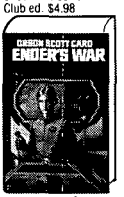

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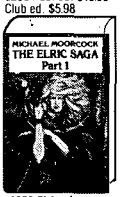

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